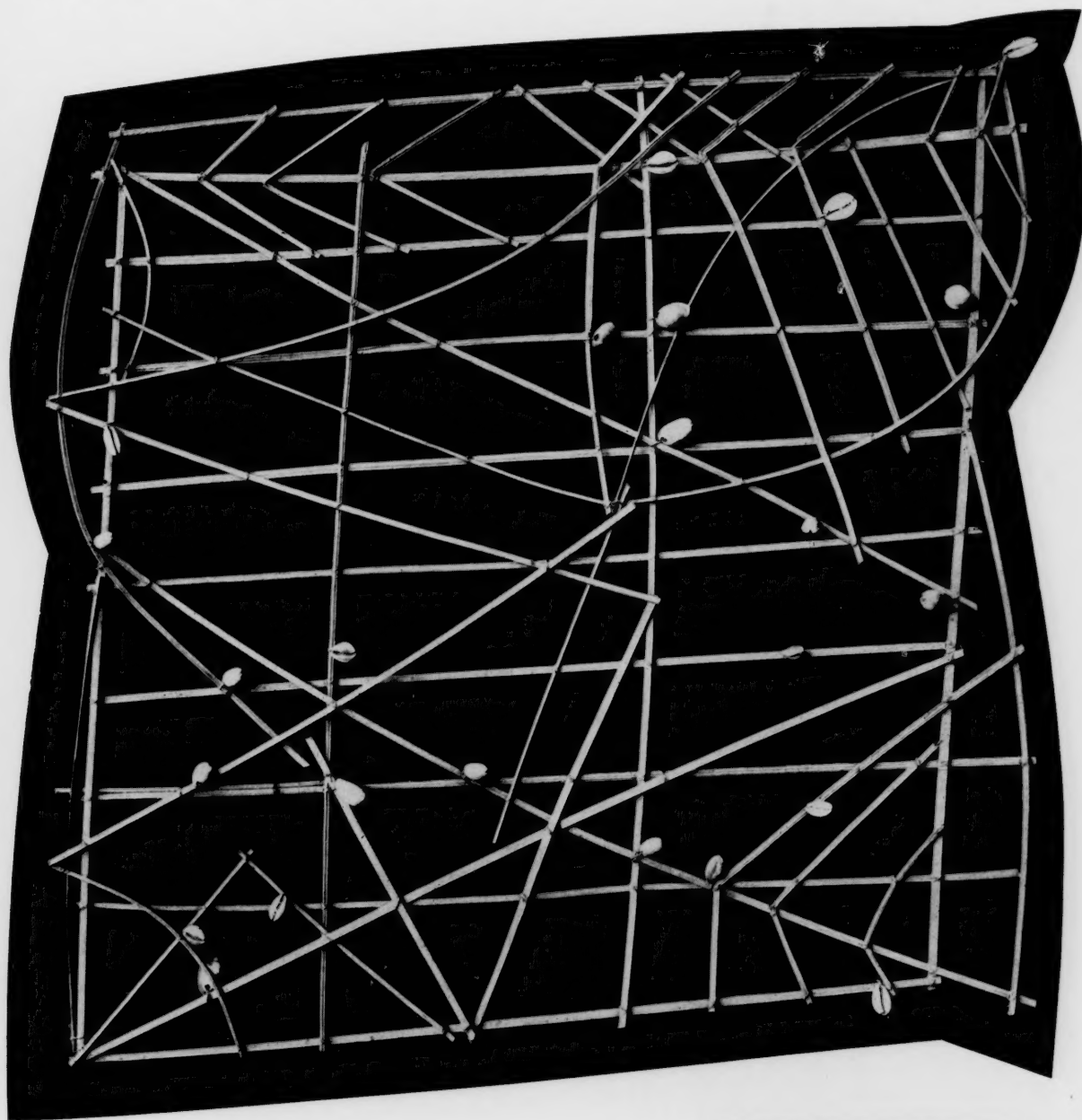


PACIFIC DISCOVERY

A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD



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September-October 1952

Volume V · Number 5

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A JOURNAL OF NATURE AND MAN **PACIFIC DISCOVERY** IN THE PACIFIC WORLD

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NONE OF THE TWENTY-NINE ISSUES of *Pacific Discovery* has given the editor quite the challenge of this special Pacific Islands issue. It was in part because he had the temerity to write the discourse that appears as EDITORIAL. But chiefly, the challenge lay in the fact that here at last was a number keyed entirely to our name and our subtitle, an answer to every reader who has gently admonished that we roam too far. Much good material has rested in file until such an issue was planned — far too much for 32 pages. There is plenty left for another such issue fairly soon. In this the editors have tried to show many facets of and outlooks on the largest geographical division of Earth, which is paradoxically all but entirely water. Obviously, we could just barely sample it: Tahiti for modern tourists; Samoa for a hint of surviving native customs; the Marshalls for a measure of “primitive” man’s mastery over the pathless ocean; Guadalcanal — the Solomons — to hint the harsh, sometimes heroic history of European “discovery” and exploration; the 1951 Vanderbilt Expedition for a glimpse of science’s unceasing search for new facts of nature; and the saga of “Vikings of the Sunrise” to show how stubbornly the darkest of human mysteries in the Pacific withstands all but speculative solution. In addition, we introduce a new page of current topics under the heading SCIENCE LOOKS INTO IT. And our question page takes the status of a regular feature, INFORMATION DESK. Keep the questions coming!

The autumnal equinox, which is marked in academic affairs by the return of sophomore and savant to campus life, finds several *PD* associate editors at their regular posts after distant summer sojourns. Dr. Ira L. Wiggins is back at Stanford University’s Natural History Museum from another year as Director of the Navy’s Arctic Research Laboratory at Point Barrow. Dr. A. Starker Leopold, who has just returned to the Berkeley campus from a three months wildlife survey covering all of Alaska, visited his editorial colleague on the edge of the Arctic Ocean. Dr. Robert T. Orr, who in addition to his Academy duties holds a professorship at the University of San Francisco, spent part of the summer in Baja California hunting — bats. These editors have promised future reports on their diverse activities.

ROMANTIC TAHITI is a well worn cliché. From the supposedly safe detachment of Whittier, California, R. C. Henderson examines this clinically, with case histories. To judge by his sometimes ecstatic tone he finds it, as a state of mind, catching. . . . Like his fellow Polynesian Doctor Sir Peter Buck, Bert Williams,

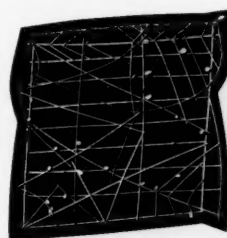
DISCOVERING PD’S AUTHORS

AMP, appears to have resolved successfully the conflict of two cultures, the superimposed alien which trained him in modern medicine, and the tradition-steeped Samoan he was born to. Such blending is doubtless the key to the future for the majority of Pacific Islands peoples. . . . Dr. Earl S. Herald is as much at home in water, especially if it’s tropical and salt, as the fishes in his care as Curator in charge of the Steinhart Aquarium at the California Academy of Sciences. His brief report on the 1951 Vanderbilt Expedition is preliminary; we’ll go aboard the *Pioneer* in the Pacific again in future issues. . . . In telling “The Secret of the Marshallese Sticks,” Neal O. Hines, who is Director of Publications at the University of Washington, has come up with the first description we’ve found of a type of nautical chart that has long intrigued our cartographic mind. . . . An Alsatian by birth and now a New Yorker, Dr. André Gschädler traces his interest in Western Pacific lands and their human and natural history back at least to his former connections with the University of Melbourne and the Australian Department of Information. . . . Dr. G. Dallas Hanna recently took time out from his general direction of planetarium construction at the Academy to accompany Olaf P. Jenkins, Director of the California Division of Mines, to the scene of the Arvin-Te-hachapi earthquake. Their report opens a new *PD* department. D.G.K.

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THE
COVER
COPY

A MICRONESIAN STICK CHART is the most fitting symbol that could be found for this Pacific Islands issue. Our cover photograph is by courtesy of the Director of the Science Museum, London. For information of this beautiful example, we are indebted to Miss Margaret Titcomb, Librarian of the Bernice P. Bishop Museum, Honolulu, who advised us of its whereabouts.

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"Vikings of the Sunrise"

FOR UNTOLD CENTURIES after the boundaries of the Pacific had been peopled by man, these islands remained isolated and unoccupied save by land shells, insects, reptiles, and birds. . . The westerly winds and the constant trades blew over empty seas, for no primitive navigator had yet dared to raise a matting sail to waft him to waiting islands. Years after countless years, the Pleiades rose on the eastern horizon, but no man hailed their coming with dance and song as the sign of the new year. The stars rose and traveled across the sky, but no craft groped its way across unknown waters by their aid. . . Pedestrians had reached the eastern bounds of the Asiatic corridor and could walk no farther. The hanging skies to the east of the Fijis remained unpierced. Beyond the eastern horizon, earth, sea, and sky awaited the coming of a breed of men who not only had an effective form of ocean transport but who had the courage to dare and both the will and the skill to conquer. The uncharted seas awaited the coming of the Polynesian navigators.*

We came from Hawaiki-the-Great
From Hawaiki-the-Long, from Hawaiki-the-Distant.
—Maori Legend*

THE MAORI SPIRIT of Te Rangi Hiroa has returned to the mythical western homeland of Polynesians. The supra-racial, scientific spirit of the Bishop Museum's late director, Dr. Sir Peter H. Buck, will sit quietly in wherever the pundits gather to discuss Polynesian ethnogeny and transpacific migrations. Those who study Pacific island peoples, their origin, history, and their culture, may well be glad that a peer among them was inheritor of both cultures, the alien culture that produces anthropologists and the native one they study. Dr. Buck was aware of his advantage when he said: "I am binomial, bilingual, and inherit a mixture of two bloods that I would not change for a total of either. . . I was endowed with a background for the study of Polynesian manners and customs that no university could have given me. My mother's blood enables me to appreciate a culture to which I belong, and my father's speech helps me to interpret it. . ." It was most fitting that, until his death a few months ago, he held one of the key posts in Pacific science.

Polynesian conquest of the central Pacific by voyaging canoe, centuries before the European "Age of Discovery," is the subject of Peter Buck's *Vikings of the Sunrise*, first published in 1938 and now reissued. In telling the story of the great Polynesian voyages and settlement of archipelagoes and islands by dispersal from the hubs of Ra'iatea and then Samoa, the twice-named Dr. Buck, always first the scientist, has skillfully avoided rhapsodizing over the exploits of his

mother's people. It is a marvelous tightrope performance. Into his own anthropological and archeological studies and those of his colleagues, he has blended the airy palimpsest of untold generations of Polynesian elders intoning to their sons the dimming myths and genealogies of their race. His two halves work in apparent harmony — while the Gaelic Buck is applying the caliper of probability to the time element in transmitted legend, the Maori Te Rangi Hiroa is justifiably glorying in the acknowledged achievements of his maternal ancestors.

What manner of men, these ancestors of living islanders? Whence came they, these tides of men,* that burst the gates of Indonesia, of Malaysia, and sailed east, ever to the sunrise, so long ago that the roots of their race can only be guessed?

If we accept the anthropologists' division of their fellow men into three main groups, Negroid, Mongoloid, and Europoid, and regard the last (the old "Caucasian") as merely a handy pigeonhole for everybody who doesn't obviously fit in either of the first two: then, Dr. Buck says, "as a result of the studies made on the living in all parts of Polynesia, it is evident that the master mariners of the Pacific must be Europoid." He puts this mostly on the basis of characteristics they *don't* show, markedly or generally, although he and other authors — Dixon, Hooton, Linton, Keesing, Oliver — refer to the presence of Negroid and Mongoloid strains in varying degree in different parts of Polynesia. Like all Europoids they are very much mixed. Broadly, the variations are linked with the lines of influx and settlement now considered most probable, which may be briefly summarized (with Oliver's caution that even this is "highly speculative"):

The Polynesian ancestors probably came into the Pacific in two major waves, the earlier one by way of Melanesia to Fiji and perhaps eastward to the Societies and Marquesas, to which were brought Negroid elements picked up along the way in Melanesia. The later one came by way of Micronesia, with the addition of much Malay blood which contained the Mongoloid element. This second wave, which rolled southeastward to Ra'iatea (Hawaiki), engulfed and absorbed the first on the meeting ground. After a long period of settlement and cultural growth in the eastern archipelagoes, the blended Polynesians spread out in all directions to populate the entire Polynesian triangle with its apexes in New Zealand, Easter Island, and Hawaii.†

They came from the west (we'll take up Mr. Thor Heyerdahl's theory a little farther on). Whether the

**Vikings of the Sunrise*, by Peter H. Buck (Te Rangi Hiroa). J. B. Lippincott Company, Philadelphia and New York. 1938 (tenth impression, 1951). xiii + 335 pp., 58 illustrations from photographs, end-paper map. \$5.00. (Copyright, 1938, by J. B. Lippincott Company. Excerpts reproduced by permission of the publishers.)

*"I loved you, so I drew these tides of men into my hands and wrote my will across the sky in stars. . ." T. E. Lawrence, *Seven Pillars of Wisdom*.

†The reader might chance to meet someone who sincerely believes that the central Pacific islands are the

EDITORIAL

waves of migration remotely took their first impulse from the Nile or even from the Euphrates — Egypt and Ur have been postulated — Dr. Buck, being a careful man with conjecture, doesn't know. Probability increases directly with our speculative progress eastward, but respectable evidence for any specific starting point is still lacking. "We may sum up the present position," Dr. Buck states, "by saying that in remote ages the ancestors of the Polynesian people did live in some part of India and worked east, but myths and legends transmitted orally do not reach back that far. They must have sojourned in Indonesia in order to reach the Pacific; the Polynesian language has affinities with Indonesian dialects. During their stay in Indonesia, the salt sea entered their blood and changed them from landmen to seamen. When the pressure of Mongoloid peoples pouring in from the mainland became oppressive, Polynesian ancestors turned their gaze toward the eastern horizon and embarked upon one of the greatest of all adventures."

It will be diverting to leave the Polynesian ancestors here, developing their double voyaging canoes and absorbing Malay blood and culture,* and take a look at another, maverick but fascinating, book. This will illustrate the fun we tourists in the temple of knowledge can have while we learn, when the high priests come down from the sacred recesses and start swinging on each other in the vestibule.

Harold Sterling Gladwin, since 1928 director of Gila Pueblo, Globe, Arizona, is one of the most competent and alert of our Southwest archeologists. (Your editor once had the privilege of doing some field work under his direction.) Archeology is "the scientific study of the material remains of past human life and activities" (Merriam-Webster); Mr. Gladwin has declared himself an anthropologist. This was easy to get away with, until it got around that he was a Diffusionist, hence beyond the pale in the sight of those anthropological high priests with whom Independent Invention is creed and dogma. He might have been content to enjoy his maverick freedom on his own range, but then he wrote *Men out of Asia*. "Furthermore," said Dr. Earnest A. Hooton in his Foreword, "to the venial offense of giving vent to anthropological

mountaintops of the "Lost Continent of Mu," and that Polynesians are descended from the survivors of a great inundation. It is difficult to argue with those who subscribe to the Mu, Atlantis, Lemuria, and like fantasies, but all the ammunition needed to deal with ordinarily rational souls will be found in *Lands Beyond*, by L. Sprague de Camp and Willy Ley (Rinehart & Co., Inc., New York. 1952. 329 pp., illustrated. \$4.75). Our review is pending.

*Readers interested in the important Malaysian and Indonesian background of the Polynesians and Micronesians are referred to *The Malays: a cultural history*, by Richard Winstedt (Philosophical Library, New York. 1950. 198 pp., illustrated. \$3.75).

A Bearded White God bringing civilization to the Americas, as revealed to Campbell Grant. (Reproduced by permission of H. S. Gladwin)

heresies, he has added the mortal sin of writing wittily and well, and of having his book illustrated by a master of irreverent caricature."*

Mr. Gladwin leads in, harmlessly enough, with his own calculated guesses as to how, long before the rise of the Polynesians, "the boundaries of the Pacific had been peopled by man" in successive, ethnically distinct waves of migration out of Asia over the ancient Bering land bridge. Australoids, Mongoloids, and whatever — each brought its characteristic traits from the old Asiatic homeland to the American melting pot. From the late Pleistocene down to a couple of millenniums ago, the evidence indicates a slow, very gradual development toward an American standard of living as represented at its best (using examples surviving to historic times) by such groups as the Pueblos of the Southwest, the bison hunters of the Plains, or the Haida of the Northwest coast.

Then something happened, to the south. High civilizations began to rise, with puzzling rapidity, in the Valley of Mexico, Yucatan, and Peru. The conservative or agnostic view may be summarized by stating that "with the knowledge of agriculture, and the use of some metals, American Indians evolved civilizations as brilliant as any in the Old World" (Hibben). Coincidentally, and unconnectedly, it may have been at about this stage in the history of the Pacific Basin that the later Polynesian influx began.

Coincidence? No connection? On the contrary! says Harold Gladwin, and he plunges off the deep end into the Pacific — with a theory to explain nearly everything. He, like Buck, poises the Polynesian ancestors on Indonesian beaches, ready to shove off towards the rising sun. But he tells who they were, where from, and when they started. Mr. Gladwin has seized two of history's loose ends and tried to knot them together across half the world from Isfahan to Tehuantepec.

Loose end number one: Who were the "bearded white gods" that so persistently crop up in the founding mythologies of each of those high American civ-

**Men out of Asia*, by Harold Sterling Gladwin. Whit-tlesey House, McGraw-Hill Book Company, Inc., New York and London. 1947. xviii + 390 pp., line drawings, maps in color by Campbell Grant. (Out of print.)



ilizations, who came mysteriously, bringing laws, architecture, and other requisites of an advanced culture, became priest-kings as well as teachers, and ultimately vanished into the mists of legend?

Loose end number two: Upon the death of Alexander the Great in 323 B.C., what became of the huge fleet of 800 ships, with their crews, that he had assembled under Nearchus at the head of the Persian Gulf to explore the coasts of the Arabian Sea and perhaps pioneer new sea routes to India? Alexander's historians told of the building, manning, and fitting out for lengthy voyaging of this vast armada. Just when all was ready, Alexander died; Nearchus hid himself off to Phrygia — "but not one word about the fleet!"

You have guessed it. About a quarter century later, if Mr. Gladwin's hypothesis holds water, the remnant of this fleet, having knocked around the coasts of India and Malaysia and taken in tow canoe-loads of assorted natives, is looking for new seas to conquer. Still with it are Greek, Egyptian, Armenian, Syrian, Phoenician, etc., survivors of the original cosmopolitan "Europoid" crews, with the women who have joined them in every port, and the accretion of various Southeast Asians and Indians — in short, all the makings of a vigorous hybrid race, with Europoid and Mongoloid components as recognized in the Polynesians of today.

Well, this *may* explain the ancestry of the Polynesians; and some of the Levantine captains, with technical know-how of Mediterranean civilizations, *may* have ultimately reached Central American shores as long-bearded old men, "white gods" to the amazed natives. Hooton calls it in his very Foreword to Gladwin's book the Nearchus *fantasy*. It is, nevertheless, a daring, challenging, even dangerous idea. Such an idea was Thor Heyerdahl's Kon-Tiki hypothesis that the easternmost Polynesians, at least, came westward from Peru.

Of all books mentioned in this piece, it is safe to assume nearly everyone has read *Kon-Tiki*^{*} or intends to. It has been accepted as one of the great true adventure stories of our time; and, anyway, it matters mostly to other anthropologists whether the young Norwegian's *idea* is more than fantasy. As things stand now, it appears far more provable on strictly anthropological grounds that all Polynesia was settled by eastward migration. Both Buck and Gladwin go into this pretty thoroughly; the latter, in fact, cites the former frequently. Buck, however, does not hurry his people across the Pacific at the pace required to land survivors of the first Indonesian sailings on the eastern Pacific shore! Perhaps this time factor is Gladwin's chief worry — he doesn't say very much about it. We

^{*}*Kon-Tiki: across the Pacific by raft*, by Thor Heyerdahl. Translated by F. H. Lyon. Rand McNally & Company, Chicago. 1950. 304 pp., 64 photographs, end-paper map. \$4.00.

find it easier to believe with Dr. Buck that the trans-Pacific island hopping was "by short voyages and numerous haltings that occupied many generations." As for the east-to-west crossing, Heyerdahl's mainstay is the fact that the sweet potato, which originated in America and was *kumar* in Peru, came to Polynesia — as *kumara*. Dr. Buck's last paragraph, indeed, begins: "The unknown Polynesian voyager who brought back the sweet potato from South America, made the greatest individual contribution to the records of the Polynesians." Gladwin didn't miss this one either; he has a regular American "shuttle service to and from the islands of Polynesia"! Sweet spuds for coconuts.

In matters like the sweet potato, anthropologists of any persuasion can call in an expert on crop-plant origins — for instance, Dr. Edgar Anderson, whose fascinating new book^{*} points to the intensive study of the genetics and distribution of the plants man takes with him, as the key to man's early wanderings over the earth.

That's where the fun comes in: to Heyerdahl the sweet potato is proof that men rafted westward from Peru to Polynesia. For Gladwin, if the tuber came from South America, why, then obviously the Polynesians got all the way to some part of the American coast. And the dispassionate Dr. Buck found satisfaction enough in knowing through *kumar-kumara* that his Polynesian forebears completed their great adventure; at least one seafarer made it to South America and got back with something of value to his people. There has to be a moral, of course. Paraphrasing the oft-quoted plea to the irate father to put up his shotgun, one might well resolve, "All right, I'll read both your books."

The anthropologists, and other scientists, deal with each other's books, harshly or kindly according to their own convictions. But their reviews and criticisms are largely buried out of sight of the general reader, in scientific journals. The public has read *Kon-Tiki*, for instance; few, however, have seen authoritative discussions of its author's basic theory. Now, with *Vikings of the Sunrise*, another enjoyable popular book, by an eminent authority who held a different view, is again available after being for some time out of print. And there is *Men out of Asia* to give added spice to the argument. Your editor makes no pretense at critical evaluation. He is merely an avid reader whose interests take him into many fields. Having read one book on a subject, he burns to know what the other fellow says, to find out where the experts agree, or disagree, and why. There is fun in this kind of reading, and, besides, you can get that nice smug feeling of being well read!

D.G.K.

^{*}*Plants, Man and Life*, by Edgar Anderson. Little, Brown & Company, Boston. 1952. 245 pp., line drawings. \$4.00. (To be reviewed in an early issue.)

Romantic Tahiti



Sunset, Papeete Harbor, looking toward Moorea. (From Kodachrome, Harold Stein)

R. C. HENDERSON

ALAND of coral reef and tropic green in the middle of the South Pacific, Tahiti has long spelled romance to the adventurous. Just what they have wanted all their lives, the bemused visitors tell you as you meet in the streets of Papeete, the island's capital, or on trips through the back country to climb the forest-covered mountains and eat wild plantain and roast pig beside a leaping waterfall.

In certain moods, to be sure, the gaudy paradise may plague them with nostalgia, but they cannot resist its eerie fascination. As if struggling against some magician's spell they tear themselves away at the end of their stay, wrapped in leis and fond farewells from the smiling, ukulele-playing natives.

Tourists linger on to make their homes in the island or they return under the compulsion of its lure. Like disillusioned Gauguin, the French paint-

er whose story is now merged with Tahitian myth, they find here a cure for the ills of a nerve-taut and highly-complicated civilization. Like James Norman Hall, whose *Mutiny on the Bounty* and other South Sea tales brought him a fortune from Hollywood, some of them would live nowhere else. Fleeing from the boredom of a drab little Midwest town, Hall found in Tahiti the peace and simplicity he craved.

From the far corners of the earth the island-loving expatriates have found their ways to this place of flying fishes and soft trade winds, of rainbow mists and exotic fragrances, of beautiful native girls with tiare blooms in their hair. It is a place of glowing stars and incredible tropic moonlight, of grass huts and hula dances, all done in nature's best technicolor, including the background of ferns and orchids, thickets of wild bananas and orange, flamboyant and bougainvillea.

The island itself is a very symbol of adventure, towering safe and strong above the pigmy steamers, the schooners and fishing boats, and the millions of miles of ocean forever battering at the reef and forever turning back under a white flag of foam. The voice of the reef is the island's voice, changing with its change of moods, and booming, wailing, laughing, sobbing, according to whether it is a brisk, windy morning or a drowsy, sun-baked noon, whether the rain is falling mistily through the early dusk or a hurricane is whipping the sea up into the sky.

Everywhere in Tahiti you are aware of the sea and the reef, and they remind you of a thousand different things. The sound is swift and rumbling, like a train across the Midwest prairies. It is deep and sinister, like jungle drums. Or it is light and airy like thin waterfalls leaping through ferny canyons, and it is low and whispering, like a cosmic lullaby.

In an inland California raisin town a young reporter lies awake, thumbing through a volume of Stevenson, thrilled by its word pictures of the South Seas and hating the musty rooming-house where he lives and the routine assignments that await him at the desk of his city editor. A night whistle shrills. His newspaper pal snores in the next room. With sudden, breathless decision, he closes the book, packs his suitcase, boards a train to San Francisco and a steamer to Tahiti, and stays to write a book about the island and live there the rest of his days.

In New York an older man shoves back a ledger, looks around the neat, tight little office as if he had never really seen it before in all the twenty years he has sat there. He takes a bag out of a closet, takes the subway to Times Square, as he has done thousands of times before. But tonight it is different. He stops at the Grand Central, buys a ticket to Florida, and is off through the Panama Canal across shimmering miles of ocean to a palm-fringed island that has haunted his thoughts since boyhood, the island of Tahiti.

Tall, thin, English-looking Frederick Simpson, the photographer whose pictures have spread the spell of the South Pacific around the world, is a good example of the Tahitian refugee from the United States. Back in the depressing thirties, Mr. Simpson was working in a hardware store in Los Angeles, his daily life a matter of lawn mowers, bolts, burrs and the like. As bread lines grew longer and bank accounts shorter, he began to have a hunch that his job might fold up any minute. It wasn't, he decided, "such a heck of a job anyway." He had read O'Brien, Stevenson, Maugham and other South Sea writers, and he had done some dreaming about cocopalms shadows and blue lagoons and dusky island girls fragrant with the flowers in their hair. Since his youth he had spent some time shooting a camera around, and this interested him more than anything else he had ever done.

Putting this and that together, Simpson decided to go to a tropical island where he would find



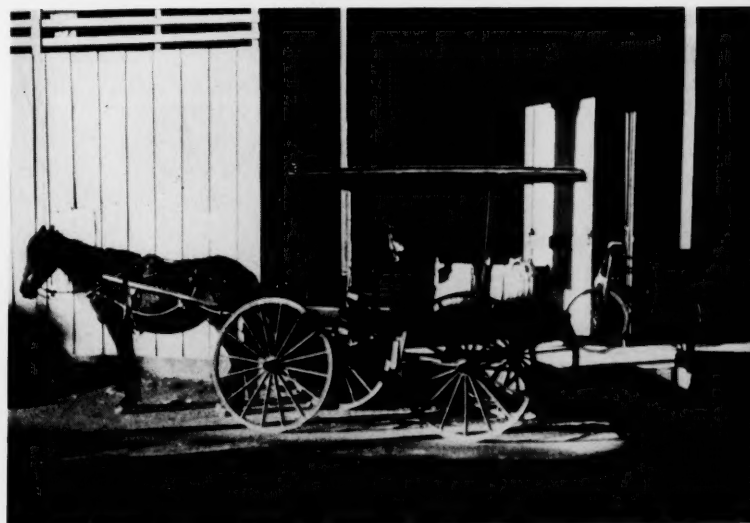


plenty of photogenic material and take some pictures for the steamship companies. So he gave the door of the hardware store a final bang, drew his savings out of the bank, bought a thirty-five-dollar camera, and was off, just like that, for Tahiti.

For fourteen of the happiest years of his life he lived in his little thatched house on the beach, took the noontime siesta, read books he had always wanted to read, went for long country rides on his bicycle, and photographed Tahitian villages and markets, weddings and funerals, scenery, flowers, and pretty girls, Chinese children, old men and women, the sea and the palm shadows on the beach. He became a student of the island's ethnic types and one of the world's great photographers.

From the first, Simpson's pictures sold to steamship companies and other customers. They have received all kinds of honors and awards and have been exhibited from London to Los Angeles to Hong Kong. He has photographed Bali, Hawaii,

ψ The Chinese merchant ("tinito") brings produce to market in huge wicker baskets. (From Kodachrome, Harold Stein)



Papeete and its harbor face the Pacific to the northwest.
(From Kodachrome, Harold Stein)



"Babe" was an unsophisticated Tahitian girl.
(Frederick Simpson)

and other Pacific islands, has traveled around the world a time or two, photographing as he went. And he will never again be as old and tired as he was before he left the hardware store and recaptured his youth in Tahiti.

Two years ago Frederick Simpson returned to Los Angeles to visit his brother and photograph Californians and California scenes, half-heartedly. If you tried to talk to him about anything but Tahiti he seemed absent-minded and remote. Wistful as a stray cat in a strange garret.

The other day he came up grinning, a steamer ticket in his pocket and a blue gleam in his eyes. "I'll spend the rest of my days in Tahiti!" he announced defiantly.

Shaped something like a figure 8, Tahiti is about 30 miles long, with coastline of more than 100 miles. Largest of the Society Islands, it is more than 1,000 miles south of the Equator, in about 150 degrees west longitude. It is 6,000 miles from Asia, 3,000 miles from Australia and 3,600 miles from San Francisco.

It rises bold and mountainous from the heaving sea. The rank odor of copra is on the wind, and the elusive, intoxicating scents of lush vegetation

and a riot of tropical flowers. A host of cocopalms sway gently in the trade winds.

Your steamer rides through the breakers into the tranquil lagoon and anchors close beside the dusty Papeete streets. Brown boys swarm up the gangway and seize upon your luggage, brown girls bring you leis of jasmine and pandanus blooms. Old Chinese peddlers slap along, their funny little carts loaded with candy fruits and other eatables. Chinese merchants own most of the shops.

There is no color line in Tahiti. Instead there is a racial blending, with native grace and vigor of physique holding its own to a remarkable degree, and the best qualities often surviving. The original islanders are tall, slender and vivacious, as a rule, with thick black hair, dark eyes and skin. Says an ethnologist of the native Tahitians: "For general symmetry of form the people are unsurpassed by any race in the world."

You see the blond hair and blue eyes of the English, Irish or Scandinavian ancestry, as well as the jet-black bobs of island girls and the auburn heads of French, German or any nationality you can name. But the gentle, unaffected gaiety infests the whole population. Strangers greet you with soft Tahitian words meaning friendship, love and happiness. Words that sound like subdued yodeling. Much singing and dancing goes on in bars and cafes. The long midday siesta finds practically everybody indoors relaxing on floor mats.

The island must always have had colorful pagentry. In the early days, a century perhaps before the French took over in 1880, the chiefs wore short feather cloaks similar to those of Hawaiian royalty. They wore elaborate breastplates of sharks' teeth and black and crimson bird-feathers. Always the sea was woven into the life and mythology of the people, and canoes designed to carry images of the gods were carved with strange figures and hung with bright feathers. Now there are no chiefs, but a few so-called native princes trace their lineage back to the ruling family of Pomare and walk with the erect bearing and the lithe, pantherish tread of island kings.

The islander swims like a fish, totes heavy loads that would kill a white man, hunts wild pigs, plays ball, sings and recites ancient folk ballads. The island is full of food. A few items, such as copra, vanilla and canned pineapples are exported, mostly to France.

Clothes have always been rather a minor matter in Tahiti, where the average temperature on the

coast is 77 degrees, with no abrupt season changes. Costume is a happy-go-lucky affair, on the whole, with everybody choosing according to his taste. The primitive piece of bark with a hole in the center for the head to go through has been replaced by the cloth pareu, a kind of sarong. This simple, versatile classic serves the women as bathing suit, house dress, afternoon frock and evening gown. It is worn by both sexes, though the men prefer to leave the upper part of the body naked, while the feminine décolletage is much like the present "civilized" mode of strapless bodice. Early missionaries introduced the mother-hubbard dress, which many of the older women still wear sedately.

Visitors from Europe and other sophisticated countries often take to the pareu with awkward zeal, while the back-country barbarian likes to sport the white man's shirts and shorts or dungaree trousers. Young island belles wear the pareu with instinctive grace, but when they come to live in Papeete they are soon donning print dresses and high-heeled slippers. Some of the more ambitious ones put up their hair, use the white girl's cosmetics, learn to speak English "good like hell," and get jobs in shops and cafes.



Between December and April, a good deal of rain falls, but some comes at other times, so this cannot be regarded as a definite rainy season. One month blurs softly, seductively into another and time seems to stand still. You forget the season and the day of the week. You arrange your affairs hazily in the space between one monthly steamer's arrival and the next. The mail comes in on steamer day, and maybe a few travelers disembark. You sit indolently on the Beachcomber's Bench and wait for the letters to be sorted. You browse hungrily through month-old newspapers and magazines. You see mothly old films at a Papeete movie house, get up early to go to market and stay up late to watch the palm shadows on the beach, to sit in a bar and watch hula dances, to sing and swap tall tales.

You buy most of your food at the early-morning market and find there a kind of summary of what Tahiti eats. Long before sunrise the produce starts moving into Papeete, by way of rickety Chinese carts and by way of loads balanced in sticks across the shoulders of sinewy natives, all bound for the shed-like building the government has provided in the center of town. Here in long racks or



Above: Terauti Terautihao, a pearl diver, holds a spiny lobster that later provided a feast for the photographer. The garland of seaweed around his head is to keep his hair out of his eyes as he comes up from a dive. His garment is the *pareu*. (From Kodachrome, Harold Stein)

Below: A Tahitian, probably full-blooded, from the interior. (Simpson)



Tahitian landscape. (Frederick Simpson)

you may have to learn to enjoy. Yams, coconuts, avocados, bananas, oranges, and mangoes are brought down from the mountain jungles. Chinese gardeners bring in such cultivated crops as tomatoes, peas, beans, carrots, celery, potatoes, and sweet corn. Fresh flowers are everywhere.

In an hour or two of clamorous bargaining the produce is sold out. If you slept late that morning and had no one at the market to buy for you, you may be out of luck. You soon learn to get up early, if only for the drama of it.

Flowers are magic in Tahiti — a charm, a fetish, bringing happiness and good fortune. Leis given you on your departure are a prayer for your return. Flowers decorate the banana-leaf lunchcloth spread at picnics and are always used to honor guests. Music, too, is good medicine, throbbing through the slow tropic days and the swift mauve dusks. Songs that are centuries old mingle with the latest hits from Hollywood and Broadway.

They even sing you past the dark portals of death in Tahiti. If you sense the Grim Reaper's approach and can foretell the time of his arrival, you invite relatives and friends to your house, for feasting and singing, while you expire gallantly to the soft accompaniment of ukuleles and the voices of those you love.

World War II brought changes to Tahiti. Because of soldiers' camps in the nearby islands, the souvenir business boomed while the shooting was on. Grass skirts sold at practically any price asked for them. Jewelry and other trinkets made from seashells were also popular. Now the island is having a post-war recession, slipping not ungracefully back into the old days of primitive self-sufficiency.

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in heaps on the cement floor you find a medley of fresh fish, fruits, vegetables, eggs and spices.

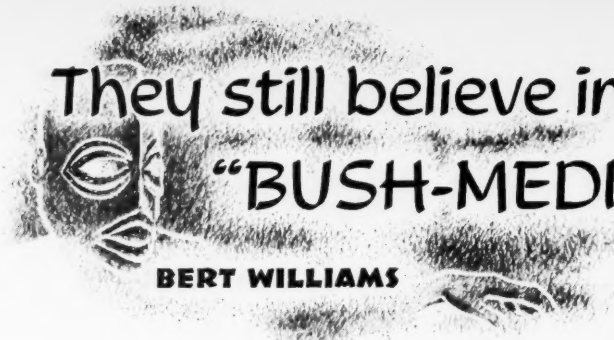
Tahiti's bold and skillful fishermen bring in fish of every imaginable sort and size, many of them brilliantly colored, like butterflies. There are oysters, shrimp, and lobsters; beef, ducks, and chickens. The pineapples, limes, lemons, and mangoes are lovely. The breadfruit and mummy apples

A young fisherman beside his outrigger with the live-box of sisal-bound split bamboo in which fish are kept submerged until needed for use or for market.
(From Kodachrome, Harold Stein)





Hanging the fishing nets to dry — a typical Tahitian scene. (Frederick Simpson)



They still believe in "BUSH-MEDICINE"

BERT WILLIAMS

PEOPLE all over the world dislike change. The average islander is no exception. He knows that his people got along very well for centuries before anybody ever heard of the *papalagi*, which is the Polynesian name for white people. He still likes many of the old ways. In particular, he often clings to the idea of devils and has faith in "bush medicine," thus embarrassing the Assistant Medical Practitioner who is doing his best to apply modern medicine among his own people. To convince these people requires a combination of diplomacy, tact, philosophy, psychology, and plenty of persuasive bluffing. This discussion was prompted by a series of recent cases occurring in Samoa.

The writer is, along with a few Samoan nurses, the only representative of the medical department in the island of Tau, American Samoa, responsible for the health of about two thousand people. He has a fifteen-bed district hospital, and is able to transfer patients gratis to the government hospital at Pago Pago (about sixty miles away) about every two weeks when a ship is available. There the hospital charge is twenty-five cents a day. Thus persistence of faith in "bush medicine" cannot be due to lack of modern facilities or to cost.

The first case arose in connection with a patient who had meningitis, and became delirious. The family kept demanding that a "bush doctor" be permitted to treat the delirium. Not until the "doctor" was threatened with being thrown in the village calaboose (the copra shed) did they desist, and withdraw, muttering curses under their breaths, while sulfadiazene cured the patient.

The second case occurred one evening when the nurse on duty reported that a man, reputed to be a "bush doctor," had come in and treated a patient in the district hospital without even considering the presence of the nurse who supposed he was only visiting. The matter was reported to the district magistrate, who immediately arraigned the case. Before trial was officially conducted,

however, the defendant stood up before the court and apologized for his action, declaring that he had only done so to humor the patient's family who had pestered him to administer treatment. He claimed he had only massaged the abdomen. He was so openly contrite that the judge and court relented, treating him only to a verbal chastisement after warning him on the section of the law he had dared to violate.

That evening I invited the "bush doctor" to my home, and, after allaying his fears over further involvement in a lawsuit, I questioned him on his art. He yielded to a convincing argument as to the possible benefits and advantages of his treatment if conducted along more scientific lines.

The man professed to be a specialist in diseases of the lower digestive tract of children who had diarrhea. For treatment he took long, thin strips of cloth, plaited to form a rope, and used it as a torch lighted from a fire. He sat facing his patient's bared buttocks, which were held toward him by a relative or friend, all this while the patient in no mean voice howled his protests. He now picked up the lighted torch in his right hand, blew out the flame, leaving just a glow, and then made circular, waving motions in the air, ending in a pretended stab at the patient's buttocks. This maneuver was repeated while the operator murmured incantations. The operation was performed daily for ten days, no more. If successful, a cure should be by then achieved.

The basic principle of this treatment has often been pondered over, without a solution being arrived at. This man, of course, couldn't offer any help here. Could it be that he was smoking out the devil?

Case three concerned a woman of about thirty-four suffering from a long-standing backache. She had visited the Hospital of American Samoa, but the pain recurred after her discharge and she decided to seek treatment elsewhere. Prolonged



This is not making "medicine," but is the Samoan ritual of preparing the kava ('ava), a non-intoxicating ceremonial drink that precedes every feast. It illustrates the Samoans' staunch adherence to old customs. (Official U. S. Navy photograph, CIC, Pacific Fleet)

"bush" treatment in Tutuila afforded no relief, whereupon she thought of her family in Manu'a and returned home.

On arrival she told her family that her pain was caused by the visitations of a long-dead relative out of revenge for the miseries he received at her hands when alive. It was finally decided to consult a noted *taulasea* ("bush doctor").

Next day the patient sent for me; unaware of the foregoing, I examined and advised her. I told her that her sickness was in the mind, and that she could be cured as soon as she willed it.

But the patient's brother, as instructed, now boiled two kerosene tins of water over a large fire. Next he took a crowbar and drove it several times into the grave of the malefactor, after which he poured the hot boiling water into the holes. This scalded the "devil" in his confinement and put an end to his evil-doings.

When this tale came to my ears, I cornered the patient and asked for information. Cajolery and flattery of the possible marvels of the art finally prevailed on her to talk. Why did she believe a "devil" was at the bottom of her trouble? She had

heard or seen no one, but she felt that this man was at the root of her evil because while living he had given her no end of trouble. She was adamant on the fact that, without the treatment she would not be alive today. When asked why she had sent for the "AMP," she stood up sedately and walked out.

There are several possible answers to the last question. Was it just a psychological complex? Was she playing somebody for a monkey? Or was it just a feminine whim?

A child of four, the last case, had been ill for about a month in the village of Faleasao, justly considered to be one of the most beautiful in Samoa. During the daytime he romped about, but at night he became feverish and delirious, and spat at or bit anyone trying to touch him. The parents decided that the case called for a "bush doctor."

The usual way of identifying a visiting haunt is as follows. One asks, "Who are you?" He replies, "I am so-and-so." "Why have you visited us?" To this the answer should be, "I am dissatisfied with the way family affairs are being managed," or something along those lines. A family *fono* (council) is held until some suitable "bush doctor" is selected.

In this case the alleged haunt was the child's grand-uncle. As there was no dependable "bush doctor" available, the father took it upon himself to visit his wrath on the miscreant from the nether land. He exhumed the grand-uncle's bones and laid them out on a mat. After heating the inevitable kerosene tin-full of water to the boiling point, he poured the steaming liquid on the bones to end forever the malady visited upon his household.

Sad to say, the child became worse. Then the village nurse was called, and the patient was fetched to the district hospital. Examination showed that there was fluid in the left pleural cavity. Considerable relief was apparent upon removal of about a pint of pus, on which the parents gazed with awe and unbelief. This was their son's tormentor, a nurse pointed out in indignation. The father was outwardly embarrassed. Later he expressed with apparent sincerity that even though fallen from grace in the eyes of those that knew better, he was nevertheless compensated in that his action had proved to himself and to all who harbor any doubts in modern medicine that the art of "bush" or "devil" magic is a lot of "boloney."

These examples are interesting survivals of Sa-

moan indifference to European ways and fashion. The Samoans are still one of the few Polynesian peoples opposed to abolishing their native customs in favor of anything foreign. This habit has been their mainstay throughout the years, this leaning on pride of race and heritage, as embodied in the slogan "Samoa for Samoans." This goal they are slowly but ostensibly attaining.

Manu'a, "Garden of Eden" of Samoa and neighboring Polynesia, lies eight hours' travel to the east of Pago Pago. Here the sun still rises majestically out of a cloudless sky to enshroud historic Saua, the holy earth from which man was created, in its robe of gold. It shakes admonishing yellow rays at Pava, the first mortal to incur the wrath of Tagaloa during the first 'ava ceremony on earth. It lights up the sandy beaches, making them dazzlingly white in the mid-afternoon, and finally sets over Lanania, where the spirits of the dead dive off to meet those of their relatives from the western islands. Manu'a, where the ocean is of the purest blue ever seen in Samoa, Tonga, or Fiji, is still living next to nature, unspoiled and unmarked by strife or war. A handful of Samoan officials are the administrative body over the inhabitants of the three islands. Small wonder that it is especially conservative.

No doubt "bush medicine" will one day disappear. Most of the people know now that modern medicine is better, and cooperate well with the medical department. But even so, when I stand on the shore and watch the giant waves smash on the rocks of O le Fee, I ask myself, what white man has a better answer to the cause of evil and disease than had my people?

END

"Looking over the health system among South Sea peoples as a whole, it can be seen that a great struggle is in progress between scientific medicine on the one hand and entrenched native ideas and practices on the other. Numbers of individuals, particularly among the Maoris and Hawaiians, are by now thoroughly in touch with modern conceptions, and promising gains have been registered even among conservative and isolated groups. . . . There seems no doubt that the islanders are going to survive and increase."—Felix M. Keesing, *The South Seas in the Modern World*, revised edition, The John Day Company, New York, 1946. xxiv + 391 pp.

For an authoritative and comprehensive picture of the Pacific Islands peoples today, with a view to their future, read this book by an eminent Stanford University professor of anthropology, which is issued under the auspices of the Secretariat, Institute of Pacific Relations, and the University of Hawaii.—EDITOR.

"Pioneer" in the Pacific

THE GEORGE VANDERBILT

PACIFIC EQUATORIAL EXPEDITION **EARL S. HERALD**

WOULD I serve as ichthyologist on his expedition to the tropical Pacific?—George Vanderbilt asked. Would I! Leaving my 6,000 live charges in Steinhart Aquarium to the care of competent assistants, I began at once to prepare for the George Vanderbilt Pacific Equatorial Expedition of 1951. Sponsored jointly by the Academy of Natural Sciences of Philadelphia and the California Academy of Sciences, this research cruise offered a splendid opportunity to study reef fishes in little worked areas. To share the task, a fine fellow ichthyologist and expert collector came aboard the 172-foot auxiliary schooner *Pioneer* just before the June 1 sailing from Long Beach. He was Dr. Robert R. Harry of the Natural History Museum at Stanford University.

First stop was Honolulu, for refueling, stores, and other equipment to add to the diving gear, fish poison, spears, nets, bottles, barrels, labels, formaldehyde, and hundreds of other items already stowed on board. For studies in the Leeward Islands, Mr. Vanderbilt invited one of the best of reef ecologists to join the expedition — Vernon Brock, Director of the Hawaiian Division of Fish and Game.

Laysan Island was next stop, where a careful check was made of the population of the endemic Laysan duck. A 1923 census had shown only six birds, but our 1951 count brought the known number of this species to 39, including 20 young.

Sharks were not uncommon in this area. The largest caught was a 680-pound tiger shark. About 120 species of fish were taken at Laysan — only 40 were previously reported. The *Pioneer* proceeded to Maro Reef, and then to Nihoa Island for the rare Nihoa finch. Six were taken alive for the Honolulu Zoo.

From Honolulu, with fresh supplies and more gear, we pointed south for more reef work. Before shoving off, we started testing a beautiful precision instrument, the Fehnjohn underwater camera. First time I took it down, the air compressor for the diving gear broke. With sad thoughts I carefully laid \$1,800 worth of camera on the nearest coral head, pulled the safety catch on my lead belt, tossed off my headgear, and made for the surface 40 feet up, fast. (We recovered the camera a few minutes later.)

On August 6 the *Pioneer* was headed for Palmyra Island, fisherman's paradise of the Pacific. Only 77 fish species were known from the island, but eight day's hard collecting brought the list to 203. One of our objectives here was to collect a series of red snap-

pers and other poisonous fishes for toxicity studies by Dr. Bruce Halstead of the Loma Linda research group, whose work was recently reported in *Time*. Why a good food fish in one area, such as Honolulu, should be deadly poisonous a few hundred miles away, is one of the foremost problems facing medical zoologists.

Most of the poisonous fishes were caught from the *Pioneer's* deck. Mrs. Vanderbilt became quite adept at this kind of selective fishing. It takes considerable skill, not so much to catch the fish, but to keep fish you don't want off the hook.

Field collecting at sea is tough business and no place for youngsters; however, I am happy to report we had two exceptions aboard, both age 13 — Miss Lucille Vanderbilt and her friend Miss Sandra Lamb. They prepared labels, distributed fish poison, collected fish — often under the most trying circumstances. Once, in the intertidal zone at Palmyra, we ran into a heavy squall. It was well over 100° before the rain, but it got so cold during the storm we had to stay in the 83° water for two hours (most of the time with head under to avoid the pelting rain) before we could resume work.

A high spot of the cruise was a record 105-pound Allison tuna Lucille Vanderbilt landed in 56 minutes without help. It outweighed her by two pounds!

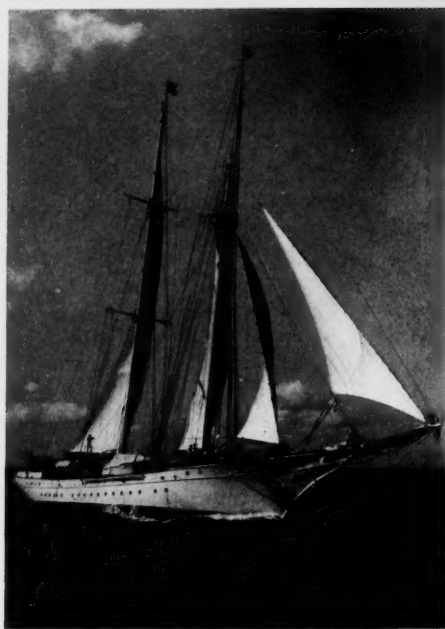
Christmas Island had more fish even than Palmyra. Never had such collecting been seen as that we had by a light over the side at night — small organisms and larval fishes by the thousands. From here we reluctantly returned to Honolulu.

Since the collections arrived at the Academy in San Francisco, much serious study has been devoted to them. George Vanderbilt has continued his interest in the ichthyofauna of the eastern tropical Pacific by sponsorship this past summer of the fish studies of the Pacific Science Board's ecological group at Raroia in the Tuamotus. Dr. Harry will be returning soon with a considerable amount of new material on the fishes of the area.

Ichthyology is still in its infancy as far as the eastern tropical Pacific is concerned. A new bird or mammal from this region would be a startling discovery, but it doesn't take much field work to find new fishes. Ecological work has hardly begun. Thanks to George Vanderbilt, however, the basis is being developed for a sound understanding of the fishes of this great region of the Pacific Ocean.

END

(Turn to the following pages for pictures)



Left: George Vanderbilt's auxiliary schooner. Above: Ichthyologists Robert Harry and Earl E. Riple are shown processing the catch from a reef poison station at Paia. After a week or more in formaldehyde the fish are packed in 55-gallon oil drums for shipment.



Top: A lone Laysan duck, as if conscious of his extreme rarity, struts between two Laysan albatrosses. Center: A nesting booby bird on Laysan Island of the Hawaiian group. Bottom: Hawaiian seals, adult and young. Right: A young Laysan albatross.
(Photographs by Vernon E. Brock)



auxiliary schooner *Pioneer* running into Honolulu, August 1951.
 Dr. Harry and Earl Herald making a preliminary field identification
 station at Palmyra Island in the central Pacific.
 The fishes are carefully wrapped in small bundles and
 packed for shipment. (Photographs by Chuck Smouse, Honolulu)

Above: Expedition Director George Vanderbilt (left) with Captain T. I. Vatland on the bridge
 of the *Pioneer* as the ship cleared Diamond Head en route to Palmyra Island. (Chuck Smouse)
Below: The results of the expedition will begin to appear in scientific publications
 after many months in the laboratory of segregation and final identification of the specimens.
 Dr. Harry is examining some small gobies, his specialty. (Photograph by F. L. Rogers)



(Courtesy Bernice P. Bishop Museum)



THE SECRET OF THE M

NEAL O. HINES

THE SHIPS that ply westward out of Pearl Harbor, and the aircraft that touch at Kwajalein before winging on to Guam, are traversing a Pacific area whose people made a unique contribution to the history of navigation.

In Micronesia, long before the white man brought into the Pacific his ships and his compasses, there had been developed a practice of navigation by chart. The Micronesian charts were the stick maps of the Marshall Islands, primitive devices which were in use almost to the beginning of this century and which represented a secret and curious art of the Marshallese chiefs.

The secrecy itself was a curious thing, or, rather, the remarkable preservation of it well into the era of international political, commercial, and sectarian competition of the nineteenth century. For even the blunt and prying white man, who left the "native" little he could call his own, was years in learning the meaning of the Marshallese sticks.

A late and hasty visitor to the Pacific, I saw my first stick map (a "native handicraft" example, of course) in the day room of the Guest House at

Kwajalein in 1949. I was with a University of Washington party bound then for a radiobiological resurvey of Bikini and Eniwetok, a party that would be stopping briefly at Likiep, on the way home, to collect control samples of marine life. At Kwajalein, the young Navy officer who showed me the chart had the general idea of its use (as well as a surprised respect for the seamanship of the modern Marshallese), but he assured me that at Likiep I would meet a man who would tell me more. I would indeed, although he proved to be not the man the young officer meant. I met Raymond DeBrum.

After our Navy LCI(L) had dropped anchor in Likiep lagoon, Raymond came, dripping wet, from the waters of the lagoon, where he had been working on a boat, swarthy, stocky, middle-aged, smiling broadly but politely refusing to shake our hands with his wet ones. Some days later, when I had made awkward inquiries about stick maps, Raymond and a friend, Mijjon, built for me a *rebbelib*, a master chart of the Marshalls.

Raymond's chart was of Navy PX "native han-

dicraft" quality too. Our schedule for departure forced him to work too fast, and he apologized, unnecessarily, for the results. But the effort was an act without price. I had thought he would put together a simple little frame such as I had seen at Kwajalein. Instead, he and Mijjon gave me all

meaningless, usually, to the uninitiated, including the missionaries, traders, and sea captains who eventually tried to understand them. But much of the mystery was in the charts' utter simplicity. The charts were frameworks whose lines and curves represented the observable *crests* of Pacific waves

as the waves were bent or altered by passage about islands.

The charts recorded the ways the water looked to a navigator standing at the bow of a Marshallese vessel. They were the products of genera-

THE MARSHALLESE STICKS

of the Marshalls. Working on the verandah of Raymond's house, the two men copied the chart from one reproduced on a page torn from an old German book — *Die Stabkarten der Marshall-Insulaner* by A. Schuck (Hamburg, 1902). The design Raymond chose to reproduce was that of a chart once owned by Robert Louis Stevenson. Later, when I had a chance to examine the references in Schuck, I realized the depth of Raymond's interest. The Likiep copy of Schuck had been owned by Raymond's father, Joachim DeBrum, and it was Joachim who had helped the outsiders penetrate, finally, the beautifully uncomplicated mystery of Marshallese navigation.

The stick maps are not rarities, although authentic specimens seldom are found outside museums. As objects, they are mere frameworks of coconut palm or pandanus reeds secured in proper patterns by bindings of pandanus twine and formed to compose rough representations of oceanic areas. Cowrie shells lashed to the reeds show the locations of atolls and islands.

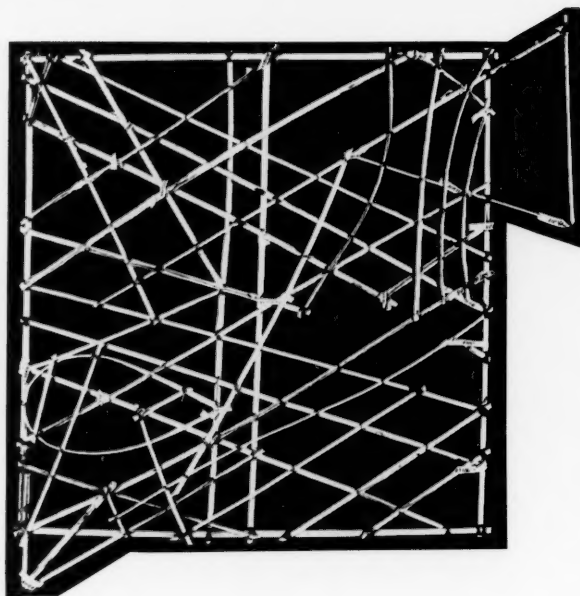
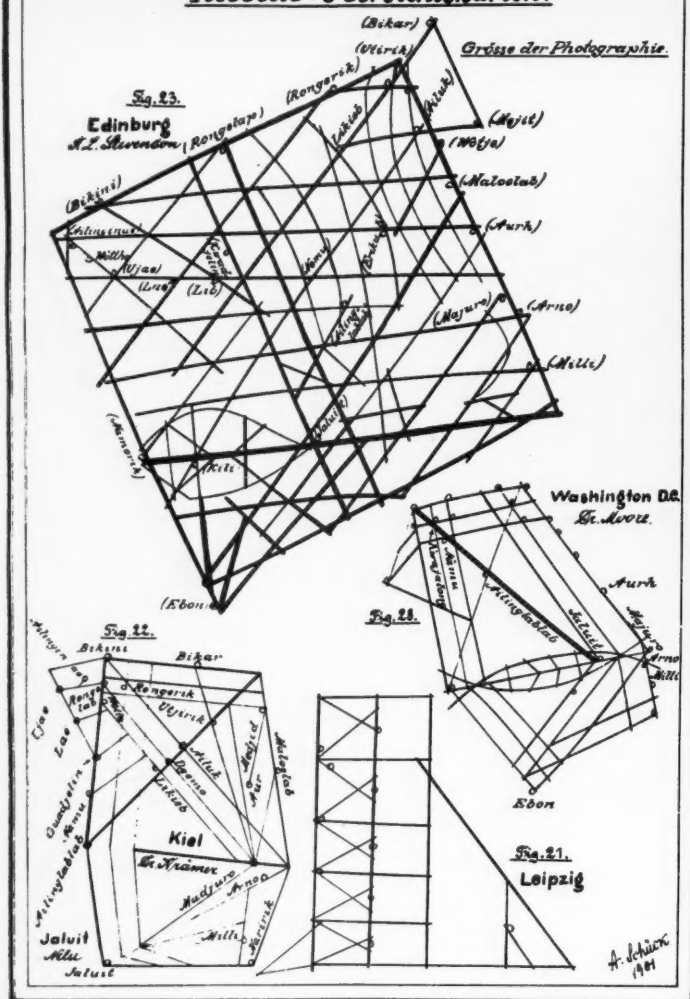
The charts are of great variety. They were personal things, recording not measured distances and calculated terrestrial relationships but the individual observations of the men who fashioned them. They were both charts and navigation notebooks, so that charts of identical areas might appear quite unlike, their dimensions and forms depending on the experience, skill, and taste of their builders. They also were, of course, the special treasures of their owners, delicate and perishable lattices recording the accumulated knowledge of generations as the art of navigation was transmitted from the chief to his son. They were read and consulted only by the leaders of voyages.

The Marshallese navigators guarded their secrets even from the people of their own tribes. The personal quality of the charts made them quite

tions of familiarity with the surface of the sea—the tools of men who had discovered that the great waves, rolling ceaselessly out of the distances, crossed their part of the earth, Micronesia, in directions and patterns that could be seen by the son as they had been seen by the father. Other elements unquestionably entered the solutions of navigation problems, but the charts of the Marshallese chiefs traced highways where other sailors saw only the endless roll of the blue Pacific.

With the stick chart the navigator could seek to determine his direction or probable position by watching the crests of waves and checking their lines with those of the chart he held in his hands. But, if the charts were simple, navigation was not. The navigator who wished to guide a flotilla of canoes from Majuro, say, to Rongerik, would depart from Majuro knowing that he must sail, as accurately as wind and water would permit, a north-northwest course crossing a succession of intersections of crest-lines of waves rolling from north, east, and south. If he could follow that course, he came safely to the shelter of a lagoon. If he became lost, he could hunt for an identifiable wave line and set off on a new tack. If he overshot his mark, he could lead his people back into the island chains, hoping for another landfall, unless storm or mishap or starvation intervened.

The charts were devised, of course, by people who lived on groups of little islands. They were not the instruments of transpacific migration, for they necessarily encompassed known and frequented destinations. Their uniqueness lay in the fact that they *were* charts — charts used by people who had no paper, who made little use of drawing, who had only elementary methods of measurement, but who taught themselves to record, with sticks and cowrie shells and memories of sailing experience, the positions, sizes, and direc-

Rebberib-Übersichtskarten.

This is the page out of Schück's *Die Stabkarten der Marshall-Insulaner* from which Raymond DeBrum copied the Robert Louis Stevenson chart (Fig. 23). The page had been removed from the volume formerly owned by Raymond's father, Joachim DeBrum, who helped Captain Winkler draw from Marshallese chiefs their secret of the stick charts.

Raymond's copy (above) was incomplete because he was forced to work in haste. He used strips of adhesive tape, rather than cowrie shells, to mark islands and atolls.

tional relationships of tiny coral islands flecking hundreds of miles of sea.

Records of the white man's earliest expeditions into the Pacific carry few references to the Marshall Islands themselves, much less to stick maps. James Cook, with a whole new world to explore, found more exciting harbors than those of the Marshalls. Father Chamisso, who crossed the Pacific with Count Otto Kotzebue's *Rurik* cruise of 1817, spoke to one De Torres, a Marianas native of Spanish descent, who said that the Pacific navigators used a "stick" which was supposed to indicate direction, but it was not clear that De Torres knew what he was talking about or that, if he did, Chamisso understood him correctly. Count Kotzebue himself, on the Island of Wotho, talked to a chief named Langediak who seemed to under-

stand the purpose, if not the action, of the *Rurik's* compasses. And a Caroline Islands resident named Edack, stranded in the Marshalls, showed Kotzebue so accurately the positions of the Carolines and the Marshalls that the count was able to prepare rough sketches placing the islands in their approximate positions. But little or none of this, so far as the records show, actually touched the Marshallese use of charts.

It is difficult — now that we have fought in the Pacific, have established daily air transport across it, and have detonated atomic bombs in the Marshalls themselves — to realize that we are less than fifty years from a more leisurely era in which Micronesia was bound to the German Empire and the Pacific was the common ground of adventure and commerce, of sail and steam, of trader, poli-

tician, missionary, scientist, and writer. But, with Germany in the Marshalls, it was a German Navy officer who apparently became the first (save, perhaps, one American missionary in 1860) to get more than a superficial understanding of the uses of the chiefs' sticks and cowrie shells.

The officer was a Captain Winkler.* The man who helped him was Joachim DeBrum, of Likiep.

In July, 1896, Winkler was stationed at Jaluit during an annual circuit of inspection of the Marshalls. There he obtained two charts "made of a number of sticks laced together in a rude lattice-work, and on this at various points were tied small shells." Winkler was curious. He paid a visit to Lojak, a chief noted for his skillful piloting. Lojak talked a little, but vaguely. Winkler came away believing that the sticks somehow represented ocean currents.

On his next trip to the Pacific, a year later, Winkler had better luck. Arriving in Jaluit in November 1897, he met there a Captain Kessler who had spent ten years in the Marshalls and who was friendly with the local chiefs. Winkler and Kessler went to Lojak and to Nelu, another chief. But, in Winkler's account, it took the help of "a half-breed named Joachim DeBrum, called Jochem, who came to Jaluit once in a while to consult the resident physician," to get the true story from the chiefs. "Jochem was an intelligent man, spoke English and the Marshall language, knew well the islanders, among whom he grew up, and was also a good sailor."

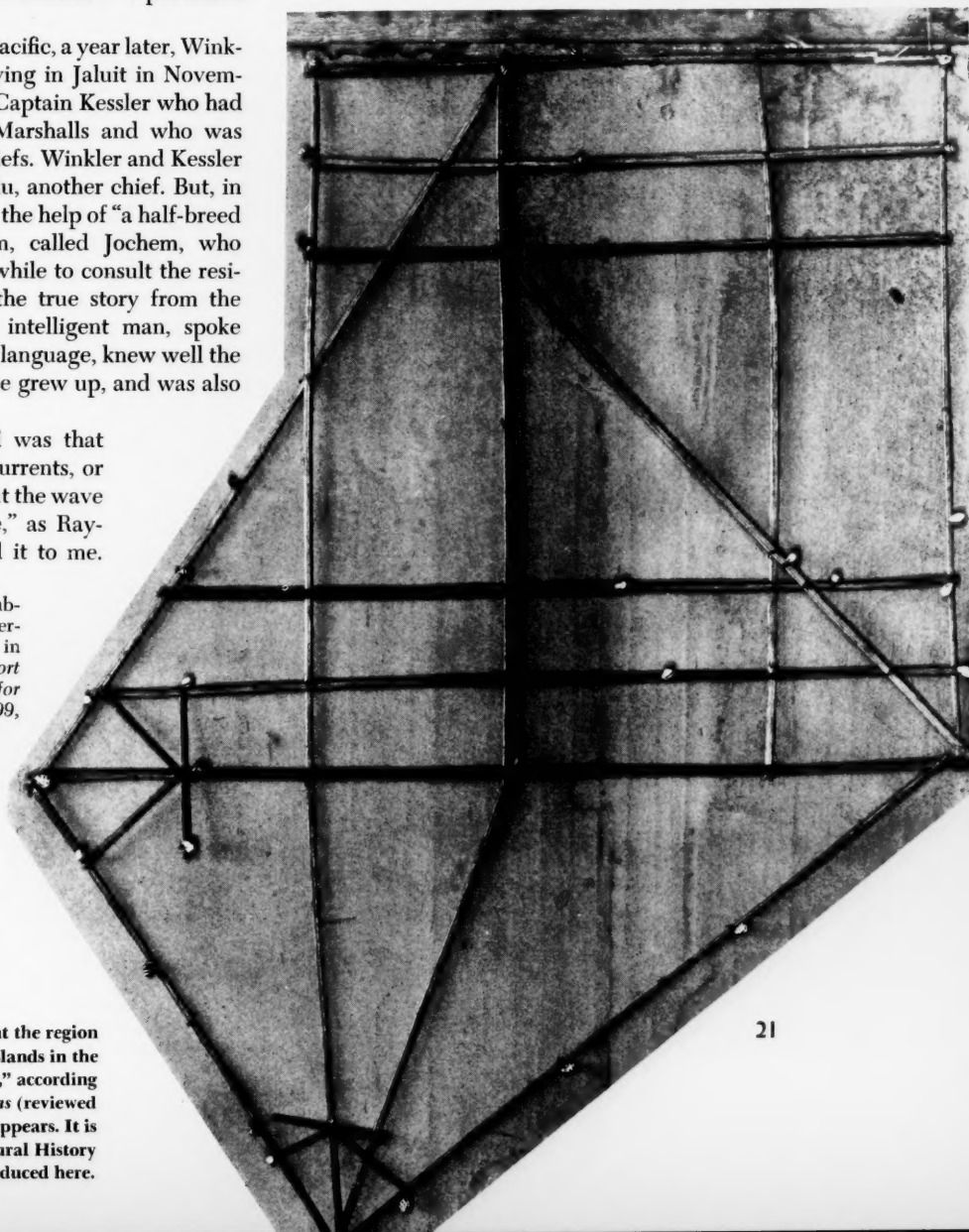
What Winkler learned was that the sticks indicated not currents, or winds, or paths of stars, but the wave crests — the "mean wave," as Raymond DeBrum explained it to me.

*Winkler's account, first published in *Marine-Rundschau*, Berlin, in 1898, was presented in translation in the *Annual Report of the Smithsonian Institution for the Year Ending June 30, 1899*, Washington, 1901.

This chart is "said to represent the region of Jaluit, Namorik, Kili and Ebon islands in the Marshalls, and Makin in the Gilberts," according to the caption in *Arts of the South Seas* (reviewed in this issue) where a smaller cut appears. It is 42 x 43" and is now in the Chicago Natural History Museum, by whose courtesy it is reproduced here.

Winkler did not learn, nor could Lojak have told him, how many generations of trial and error had gone into the preparation of charts that placed correctly, for working purposes, the dots of Micronesian islands. He found, however, that Marshallese navigation had its own terminology.

The ocean swell, adapting itself to the presence of an island, was a *dunung*. The *rilib*, or backbone, was the eastward *dunung* of the Marshalls and was, in fact, the strongest *dunung* of the Marshall group, where the prevailing wind is from east to west. The western *dunung*, the *kaelib*, overborne by the eastern wave, was far less strong and was apt to be missed by the unpracticed observer. The *bungdokerik*, the *dunung* "from the south," was quite as strong as the *rilib*. The *bungdokerik* was

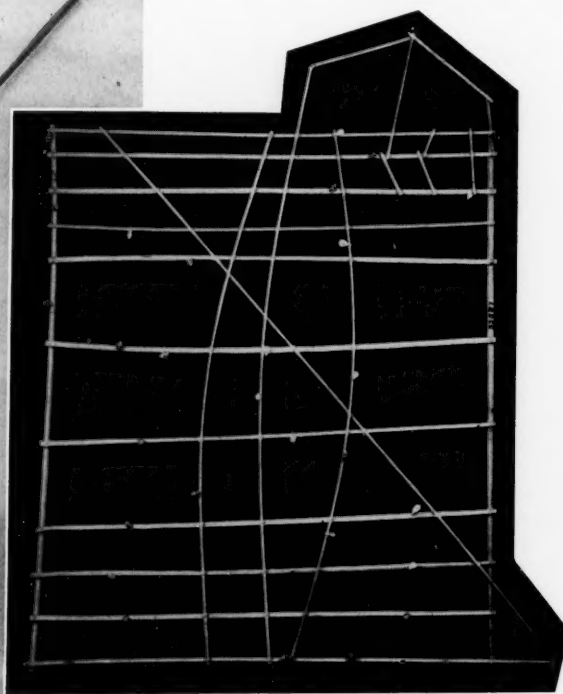
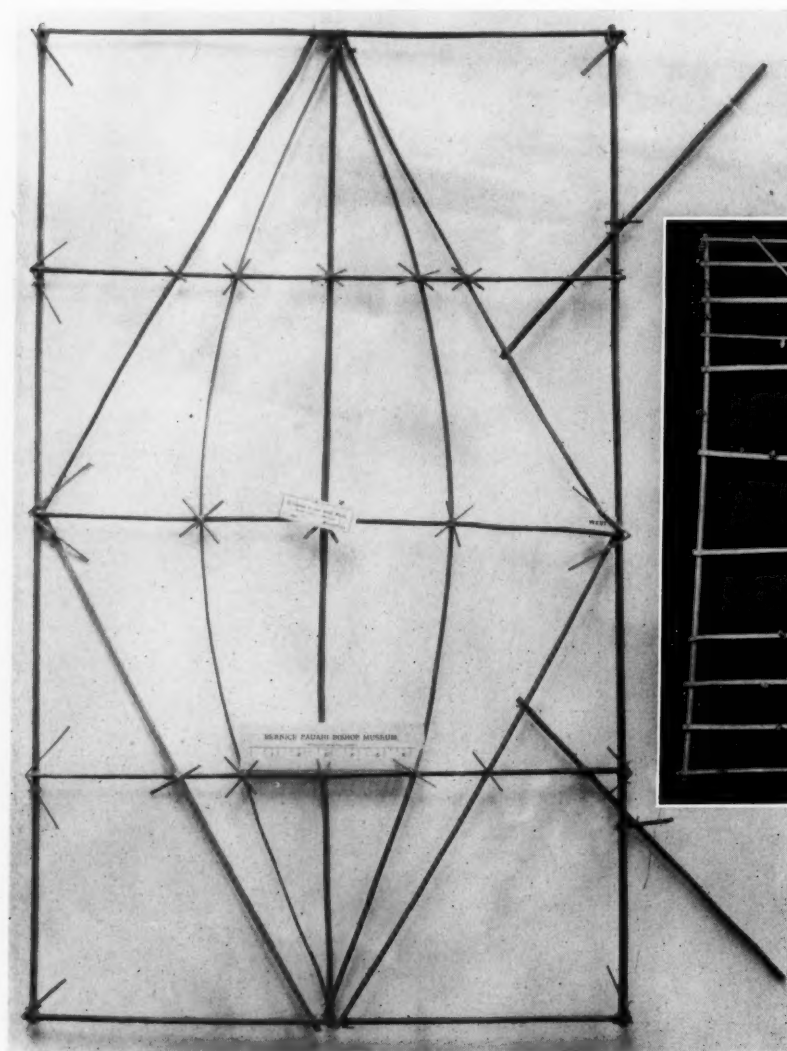


that swell which, coming from the northern Pacific, was most easily found in the Northern islands.

There were operational terms. The *boot* was a nodal point at which swells, diverted by islands, crossed one another. The *okar*, or root, was a crest-line leading to an island as, the Marshallese said, the root leads to the palm tree. *Nit in kot*, hole, was a term for the position of the navigator who, caught in a cul-de-sac, was forced to turn about. And *ai*, Marshallese for foam, was used in compound to indicate various observational distances from the land. *Djellad-ai* was the distance at which palm trees could be seen from the mast of a canoe and *eged-ai* the distance at which an island could be seen from the canoe itself. *Djug-ai* was the distance at which land was not visible at all.

There were, in fact, three different types of charts. The *rebbelib* was the chart of the entire island group. The *meddo* was the sectional chart, encompassing smaller clusters of islands. But for the novice there was the *mattang*, or instructional chart, used in the initiation of the young navigator in the art of sea reckoning.

Winkler believed that the Marshallese navigation was principally inter-island and local, the regular movement of a people who, existing on land which was barely out of water, sought fun and change in visits to the homes of neighbors. Schuck doubted this judgment, noting that even local traffic involved canoe trips of several hundreds of miles. But, long or short, the passages usually were made by fleets of vessels bearing men, women, children, animals, and provisions and led by the chief's pilot canoe. On such trips the chief and the sub-chief the *leotagetag*, stood



↑ This chart is attributed to the Gilbert Islands. (Courtesy Peabody Museum, Harvard University)

← According to the museum label, this is a "compass to use with medo." (Courtesy Bernice P. Bishop Museum, Honolulu)



A CANOE AND NATIVES OF MULGRAVE'S RANGE.

at opposite ends of their canoe, the one at the bow becoming the principal officer and, so that there be no doubt of his vigilance, singing continuously.

Even for the people of the sea the journeys were always attended by danger. The season for travel began late in June and ended in September or October, but even in the German period, when the Marshallese certainly did not have their ocean to themselves, there were instances of disastrous voyages.

In one, canoes sailing from Ebon to Jaluit became lost in a storm, tried to return to Ebon and, giving that up, set out to hunt for Kusai, 300 miles from Ebon but marked by high mountains which frequently proved the last hope of lost navigators. Many members of the expedition did not live to see the mountains, however, and the survivors existed for a final two days on the blood of the dead. The few who reached Kusai were returned to Ebon aboard a British ship.

In another case, people sailing from Jaluit to Ebon found themselves, after four weeks, at Milli, in the eastern Marshalls. There they stoutly re-

fused to complete their trip aboard a European vessel, saying that they were quite able to proceed by canoe. The little fleet returned to Jaluit in safety but, on the run toward Ebon, four vessels were lost and the others were carried westward, far off course. A few survivors eventually gained Namorik.

Raymond DeBrum, Joachim's son, was of calm and competent middle age in 1949. Like Joachim, he was a boat builder. He lived in the big frame house that had stood on Likiep since 1904. And on the verandah of the house, on shelves which held hundreds of books and magazines, were many of the books that once belonged to Joachim.

Winkler had been right when he wrote that Joachim de Brum "was an intelligent man . . . and a good sailor." Raymond's father, half Portuguese, half Marshallese, had loved the sea and all the lore of it. That is why, I think, that Joachim, calling one time at Jaluit to consult the resident physician, went down with Winkler to draw from Lojak the secrets of an art soon to be lost in the quick flow of Pacific destiny.

END

♣ Allowing for some idealization of the Marshallese crew by the artist working in England from ship's officers' sketches and notes, this represents a Micronesian outrigger before the era of European influence. It is from *The Voyage of Governor Phillip to Botany Bay, 1789*. A copy of the second edition of this work (1790) may be seen in the San Francisco Public Library. (Bernice P. Bishop Museum)

The Discovery

of Guadalcanal

ANDRÉ GSCHAEDLER

Prow of a Solomon Islands canoe. This type is described in *Arts of the South Seas* (p. 181). The elaborate decoration is to guard against evil spirits. (American Museum of Natural History)

der of Francisco Pizarro. The works of the inhabitants of Peru, their paved roads in the mountains, their palaces made of huge stones joined without mortar, filled most Spaniards with admiration, and led some of them to make a study of the past of the very unusual people of Peru. The Peruvians had no writing, and the main source of information was stories from old people who had obtained their knowledge through oral tradition. Needless to say in passing from one generation to another stories were gradually transformed into sagas with little truth in them.

According to some elderly Indians interviewed by the Spaniard Pedro Sarmiento de Gamboa, the Inca Tupac Yupanqui had of old sailed southwest and reached two islands called Nina-chumpi (Fire Island) and Hahua-chumpi (Outer Island). From these islands the Inca had brought back the skin of an animal resembling a horse, many slaves, and large quantities of gold.

Gold! Maybe another heap of gold like the ransom of Atahualpa, the Inca executed by Pizarro, was to be found in the South Seas! How far were the islands? The only thing Sarmiento could find out was that the Inca had been away for several months. Sarmiento got the Spanish authorities interested in his project to go out and look for the islands, and in those days there was no lack of reckless adventurers willing to go on such a voyage. In the history of exploration, legends were a powerful incentive. In North America the Fountain of Youth in Florida, or the Seven Cities of Cibola, and in South America the Land of Cinnamon or Eldorado enticed Spaniards to explore

A HANDFUL of daring men recently faced the dangers of the Pacific Ocean on a raft in order to try to reach Polynesia and substantiate a theory. There is an old tradition among the people of the South Pacific islands that their ancestors came from the east, while it is generally believed by authorities that the Polynesians came from the west, from Asia and the neighboring islands. Thor Heyerdahl and his companions on the *Kon-Tiki* wanted to prove, and succeeded in proving, that it is possible to reach the South Sea islands from Peru on a flimsy craft, and that the ancestors of the Polynesians *may* have done so centuries ago. It was an adventure which could have ended very sadly, but everything turned out all right.

Nearly four hundred years ago, another group of explorers also sailed from Peru in order to ascertain whether an ancient tradition of the Indians had any foundation. The explorers were Spaniards who had come to the land of the Incas attracted by silver and gold. Many of them had participated in the wars which followed the mur-

hundreds of miles of deserts and dense forests, and thus penetrate far into the interior of the mysterious continent.

On November 19, 1567, two ships sailed from Callao in search of the islands of the Inca, with some one hundred and fifty men aboard, eager to become rich. Although the two galleons were of 250 and 150 tons, and therefore much larger than Thor Heyerdahl's craft, the adventure involved many risks known and unknown. That part of the sea was entirely unknown to the Spaniards. They had only the most primitive nautical instruments, they had only a vague knowledge of the winds and currents they were likely to meet with, and they had very little protection against diseases. The leader of the expedition, called the captain-general, was Alvaro de Mendaña, a young man of twenty-five, and the nephew of the governor of Peru. His uncle had wanted to give him a chance to become famous and rich. Sarmiento was to be in charge of navigation. This was to cause much friction between the two men during the voyage, Sarmiento always wanting to go in the direction of anything which looked like an island.

The little fleet steered southwest to about 15° S. latitude, then west and northwest. Day after day went by, and no land was seen. Sharks and dolphins followed the ships for a while and then disappeared. One day, a man fell overboard and it took an hour to rescue him. Finally, on January 15, 1568 a small island was sighted. As it was getting dark, Mendaña decided to wait until the next day to land, and called it Island of Jesus. It was one of the Ellice Islands. The following morning, however, one of the ships had drifted so far away from the island that it was decided to proceed. Everybody was very much disappointed, but there was no remedy. Trying to come back might have meant the loss of a couple of days or more.

Two weeks later, signs of land began to appear on the sea — floating coconuts, branches, sea-snakes; and sea-birds came shrieking towards the ships. On February 7 a boy who was keeping masthead watch shouted: "Land! land!" and soon everybody could see the vague contours on the horizon. Had the Inca Tupac Yupanqui traveled that far to get his gold, or had his islands been bypassed? More than one Spaniard, and particularly Sarmiento, must have been wondering. Be that as it may, there was now land in sight, where refreshments could be obtained after many weeks of hardships. The approach of land was very dif-

ficult on account of the hidden shoals, but finally a passage was found, and the vessels entered a bay which was to be called Bay of the Star, because the planet Venus was shining above it, in full daylight. On both sides of the bay the land stretched for miles, and Mendaña decided to call it Santa Isabel.

The Spanish ships were soon surrounded by several canoes full of frizzy-haired, dark-skinned natives. These canoes were particularly artistic. Each of them resembled a crescent moon and was inlaid with pearl-shell. The natives were not hostile, but rather shy, although they were willing to pick up trinkets thrown to them by the men of the ships. Finally some of them agreed to come aboard, and touched everything they saw, trying to take various articles.

The first thing the Spaniards did when they landed was to erect a tall wooden cross, and to hear Mass said by one of the Franciscan fathers who had come with them from Peru. The native chief of the area was called Bile-Banara. He did not marshal his warriors to throw the intruders out of his land; on the contrary he came down to visit them, bringing food. Bile, as the Spaniards were to call him, was a tall man, very powerfully built. He wore a headdress of black and white feathers, and many bracelets on his arms. For the next few days, the intercourse between natives and Spaniards was very friendly, the former bringing food regularly—then all of a sudden they stopped coming. Maybe the natives thought the Spaniards were taking advantage of their hospitality. Sarmiento was sent inland in order to see why Bile was not appearing. This caused a stir among the natives, and soon their conches and drums were heard on every side, relaying the news that the white men were moving inland. Bile was ready with two hundred of his warriors near a stream. By diplomacy, Sarmiento succeeded in renewing friendship, but as the Spaniards were intent on exploring the country, the natives became hostile, and arrows started whizzing around them. Sarmiento first ordered his men, twenty altogether, to fire in the air, but when some arrows hit their mark, the arquebuses were aimed at the brush wherefrom the arrows were coming. Some natives were wounded or killed. When Mendaña heard of what had occurred, he was dismayed, and did his best to restore friendly relations, but was only partly successful.

Since their arrival at Santa Isabel, the Span-

iards were wondering where they were. Today, we have just to glance at a map of the Pacific Ocean to see that Santa Isabel is one of the Solomons, a long and narrow island. But in the year 1568, it took many days spent among countless hardships to ascertain the same. The island is covered with dense tropical vegetation; some of the grass is so tall that only the head of a man will emerge. When the natives seemed to be quiet again, Mendaña decided to organize an expedition to climb the range and see what was behind it. This expedition under the command of Pedro de Ortega proved very arduous. At times, the men had to drag themselves on their hands, and the natives were constantly attacking from behind the trees. Finally, the top of the range was reached, and the Spaniards, their faces bleeding and their clothes torn, were able to contemplate the sea. Santa Isabel was an island, there was no doubt about it now.

During the absence of Ortega on his mission, a few strange war canoes approached the place where the galleons were moored. They were coming from some expedition, and thinking that the Spaniards would be pleased, they offered to them a big piece of human flesh, which seemed to be from a boy. Some of the men were so aroused that they wanted to fire upon the dark-skinned natives, but Mendaña prevented them from doing so, and ordered the ghastly gift to be buried in the sand.

Other expeditions were sent out, but they found no gold. As the vessels were too large for exploring along the coast, full of shoals as it was, Mendaña had ordered his men, shortly after the landing, to build a brigantine with local material. The little craft which could carry thirty men was finally ready on April 7, 1568, and started on a voyage southward. Pedro de Ortega was in command, and the very skilful pilot Hernando Gallego was to steer the vessel among the many dangers of the sea. Sometimes the natives were friendly, but usually there were skirmishes. After skirting the southern extremity of Santa Isabel, the brigantine made a dash to the Florida group. Then the little vessel sailed across the channel which has become known as "Ironbottom Sound," because of the many warships which were sunk there during World War II operations in the Solomons.

On April 19, the Spaniards arrived at the mouth of the Lunga River which was called later Río Ortega. A crowd of natives jumped into the sea, and shouting wildly, tried to tow the brigantine



ashore. The white men had to use their firearms to get rid of the people of Guadalcanal who were meeting Europeans for the first time. The name Guadalcanal was given the island from a town in the south of Spain whence came Ortega, the leader of the expedition. During their short stay on Guadalcanal, Ortega and his men believed they had seen traces of gold and they hurried back to report to Mendaña, sailing off Savo Island, another familiar name to veterans of the Pacific War.

The captain-general decided to have the whole fleet sail to Guadalcanal, as the island seemed to be more promising than Santa Isabel, and the two galleons followed by the brigantine weighed anchor on May 8, 1568. When the ships reached Guadalcanal a week later, it was found that the Río Ortega (Lunga River) explored by Ortega and his men was not as good a shelter as the Matanikau River which was to become famous during the Guadalcanal campaign of 1942. The Spaniards called it Río Gallego, and they landed near Point Cruz, a name which has been preserved. After Mass, the Franciscan friars decided to carry a cross to the summit of a hill and erect it there as a symbol of the arrival of Christianity in these distant lands. On the way down, the Spanish party was assaulted by natives, and a chief was killed among the latter. After that the intercourse between Spaniards and natives was always

troubled by skirmishes. During a truce, Mendaña decided to make a trip inland in order to ascertain the resources of the country. With a small escort, the captain-general passed through several villages, admiring some well-kept vegetable gardens, where the natives grew taro and greens. The borders in the garden were divided by the stems of trees laid on the ground, and the whole fenced in order to keep out the pigs. The natives, seeing that the Spaniards had no bad intentions, did not attack, but just kept out of the way. On the return trip, a chief came out to meet Mendaña, who, having nothing to offer him, gave him his white handkerchief which the native immediately put on his head.

While the two big ships remained near Point Cruz, and a party was sent inland to look for gold, the brigantine, refitted and well supplied, was sent on another exploration mission. The natives were very unfriendly, and the weather unfavorable. Most incidents with the islanders came about when the Spaniards were in need of food or water. Often it had to be taken by force, some articles, particularly strings of beads, being left in exchange. The natives behaved like children, one moment they would attack, and the next come along as if nothing had happened. Once they tried to cheat the Spaniards by offering a stuffed pig. At Aola, on the northern coast of Guadalcanal, a warm reception awaited the Spaniards. The chief ordered his men to fill the brigantine with taro and other edibles. Actually, he wanted to enlist the support of the white men against his enemies.

From the extremity of Guadalcanal, the vessel steered to Malaita. Natives were seen carrying clubs with knobs made of gold . . . Gold at last! The Spaniards got busy exchanging whatever they could spare for the clubs, until their leader had an opportunity to see the knobs more closely. They were not of gold, but of a kind of stone resembling gold. Two knobs were broken by hitting one against the other, and the Spaniards went away very disappointed. The brigantine steered south, called at Ugi Island which was ruled by a female chieftain, and from there the course was to San Cristobal. Many of the men were now pretty tired, and it was decided to join the main fleet at Guadalcanal. More skirmishes took place following the indiscipline of some of the soldiers. Gallego and his companions found the Spanish camp on Guadalcanal still aroused by a terrible event which had occurred a few days before: the

virtually complete massacre of a watering party.

The natives had been aroused by foraging expeditions conducted inland by Sarmiento as the stores of the ships had to be saved for the return journey. Ambushes by the natives were always detected by dogs. Once a Negro of the fleet was nearly caught by a group of natives. His rescuers killed some of the black fellows, and the body of one of them was hung by the leg from a tree, to serve as an example. The next day, the body had disappeared. The Spaniards were also occasionally kidnapping people, especially children, with the aim of using them later as interpreters or teaching them the rudiments of the Catholic faith. The father of a kidnapped boy tried to ransom him with a pig, but irresponsible soldiers took the pig by force without surrendering the boy. The revenge of the natives was to be dreadful. Every other day the steward of the ships used to get some water from a spring inland. Usually he had with him only a couple of Negroes carrying buckets. On Thursday, the 27th of May, however, on account of the increased hostility of the islanders of Guadalcanal, it was decided that he should be accompanied by some soldiers. The party counted about ten men. When the men were out of sight from the ships, they were assaulted by a horde of natives, only a Negro escaping by swimming to a small island in the river and defending himself with a knife. When Mendaña arrived at the scene of the slaughter, he contemplated the sad spectacle of bodies which had been cut up in the most horrible fashion. Several expeditions were organized to punish the natives, but the real culprits probably escaped. Villages were burnt down, and even today the area is practically deserted. The natives defended their homes the best they could, but they could do very little against armed Europeans. Hostilities went on until the fleet finally left Guadalcanal on June 14, 1568.

Guadalcanal had been discovered, and its soil drenched in blood. Much more blood was to be spilt there later on, but for many years after the departure of the Spaniards the island was left alone. It was not forgotten. Mendaña, who visited also San Cristobal and sent his brigantine to Santa Ana before returning to America, planned to return to the Solomons and make a settlement. On account of many difficulties, he could not fit out an expedition until the year 1595, when he searched for the islands in vain, and discovered Santa Cruz instead. But this is another story. END

SCIENCE LOOKS INTO IT

The Arvin-Tehachapi Earthquake

By G. Dallas Hanna and Olaf P. Jenkins

ON THE EARLY morning of July 21, 1952 the inhabitants of southern San Joaquin Valley and neighboring areas were rudely awakened by a violent shaking which was not a signal to get up for breakfast. The earth and all upon it seemed to be suddenly convulsed by a series of rolls or waves which tapered off gradually. The results to man-made works were soon broadcast and are generally known. The business sections of two towns, Arvin and Tehachapi, were severely damaged, several people were killed and many others were more or less severely injured. Many residences were damaged and the contents dishearteningly disordered.

This was an earthquake of intensity 7. On this scale the most severe would be 10, which means total destruction. These latter happen infrequently but one or two 7's occur each year, ordinarily. The San Francisco earthquake in 1906 is recorded as 8.

The question immediately arises, why are we subjected to such treatment? The answer, in part, is not hard to find. The outer portion of this planet on which we live is broken up into a series of blocks of irregular shape. These blocks fit together like a jigsaw puzzle, and with the passage of time some become lighter through erosion of the land surface, while others become heavier from the deposit of this eroded material in the sea or in valleys on the land. As a consequence, readjustment of the blocks is constantly taking place. This is the theory of *isostasy*.

Occasionally, however, movement on one plane is arrested, setting up a condition of increasing stress

until finally the strength of the rocks is not sufficient to resist the force. Then sudden and comparatively violent movement takes place. After a while stresses are relieved on that particular plane and all is quiet again.

These boundary planes of the blocks are known to geologists as *faults*. There are a great many in California and, consequently, earthquakes are to be expected; no one should be unduly surprised or alarmed.

The Tehachapi quake was caused by movement along what is variously known as the "White Wolf" or "Bear Mountain" fault. This particular fault extends from the southern Sierra westward into or under the sediments of the southern end of the San Joaquin Valley. As often happens under such circumstances the recent movement "triggered" some lesser disturbance on other fault planes, this time on the Garlock Fault to the southward and probably others. People felt the shaking as far away as Palo Alto and Santa Rosa to the north and Los Angeles to the south.

A major earthquake is ordinarily followed by a series of after shocks of lessening intensity which often persist for months. In this particular case, however, one of the after shocks on August 22 happened to be an adjustment close to Bakersfield. This occurred in mid-afternoon and made a shambles of many buildings in the business section. Undoubtedly some of this was owing to failure to take expected shocks into consideration in design and construction, although it is doubtful whether man can build houses that might have withstood some earthquakes which have occurred in the past.

Very sensitive instruments for recording earth motion have been developed. These are seismographs, and those who make a special study of the records are



▲ These cracks, on the Jones Ranch about 3.5 miles southwest of Arvin, are not parallel to the fault trace but are in an area of extensive cracking probably close to the trace of the White Wolf fault.

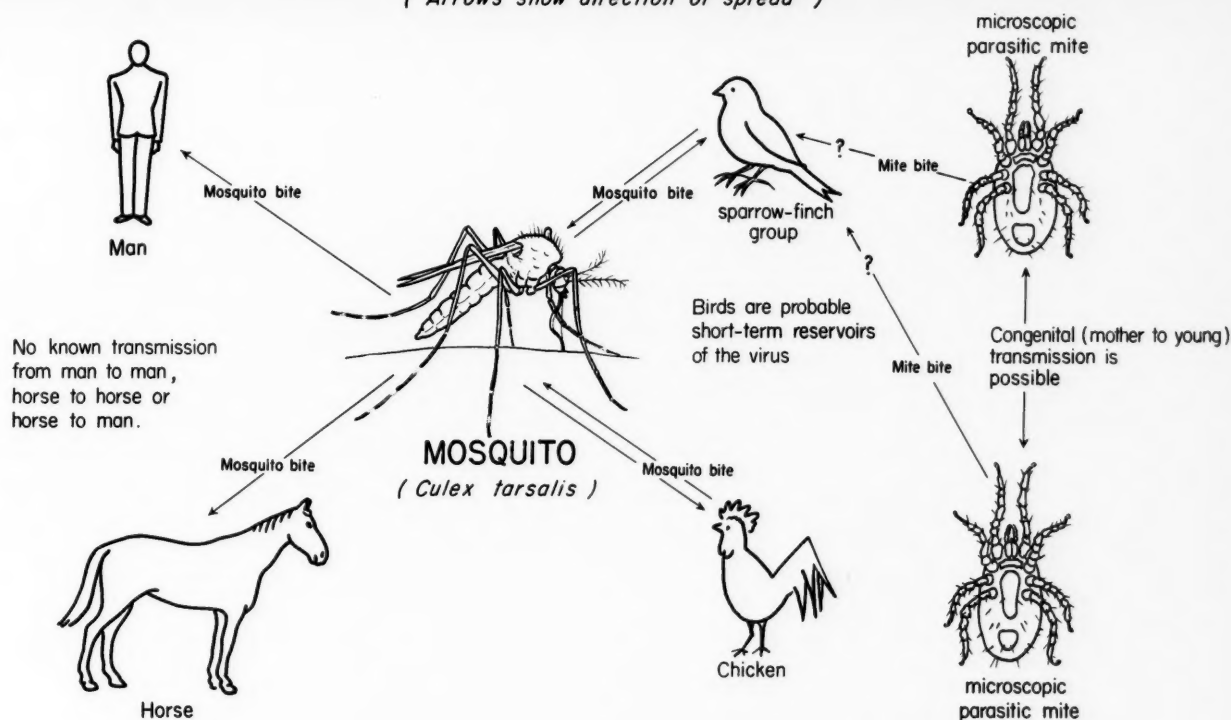
➤ This is the fault scarp at the foot of Bear Mountain, northeast of Arvin and just east of Highway 466. The displacement is about three feet. (Photographs by Lauren Wright, California Division of Mines)



Nature vs. Man: Earthquake—Sleep

HOW THE VIRUS OF ENCEPHALITIS IS SPREAD

(Arrows show direction of spread)



Much research remains to be done before a complete picture of the virus spread is known

he— Sleeping Sickness Outbreak

How Encephalitis Spreads

The cut is reproduced from a part of a current Academy exhibit based on the California sleeping sickness outbreak and the life history of *Culex tarsalis*, the mosquito that transmits it to men and animals. (By Charles Dornbach of the Exhibits Department, under the direction of Dr. E. S. Ross, Curator of Entomology in the California Academy of Sciences)

seismologists. The instruments indicate tremors far too faint for human perception and likewise tell the direction from which the waves came. Obviously if three or more suitably located seismographs record the same shock and its direction, lines drawn on a map from them will intersect. The point of intersection is the *epicenter*. The point of origin below this is the *hypo-center*, which may be several miles below the surface of the earth.

Geologists, however, must necessarily look upon the surface for evidence of movement. In the case of the July 21 earthquake there were numerous landslides along the White Wolf Fault. Cracks opened up in various places; rocks fell in railroad tunnels; the rails were twisted into a long letter S in one place; cotton rows were offset; but so far as surface evidence discloses it has not yet been determined whether the mo-

tion on the fault plane was vertical or horizontal or a combination. In contrast, horizontal motion on the San Andreas Fault which caused the San Francisco earthquake could be traced by its effects for over 200 miles. This fault extends from somewhere in the ocean north of Mendocino County into the Gulf of California.

The discussion above pertains to the type of earthquakes which are common and are to be expected in California. Where volcanic activity prevails, conditions are somewhat modified but movement on fault planes may well be the basic cause of the volcanoes.

Immediately after an earthquake the common question is, "When is the next one due?" The answer is, "No one knows," or as Professor Perry Byerly of the University of California once said: "The longer it has been since the last one, the sooner the next may be expected."

END

South Sea gallery

ARTS OF THE SOUTH SEAS. By Ralph Linton and Paul S. Wingert in collaboration with Rene d'Harnoncourt. Color illustrations by Miguel Covarrubias. The Museum of Modern Art, New York. 1946. 199 pp., 200 illustrations, including 4 in full color. \$5.00.

The Director of the Museum of Modern Art, Rene d'Harnoncourt, has kindly furnished us with a review copy of the Museum's book, *Arts of the South Seas*, six years after publication. The favor is greatly appreciated, because mention of this authoritative and richly illustrated survey of the material culture of the Pacific Islands was imperative in this issue. As a source-book of native arts, this is to the Pacific area from Polynesia to Australia and New Guinea what Inverarity's *The Art of the Northwest Coast Indians* and Davis' *Native Arts of the Pacific Northwest* are to their region. The principal authors were both on the faculty of Columbia University. Paul Wingert still is; Ralph Linton is now Sterling Professor of Anthropology at Yale. Rene d'Harnoncourt, whose institution is one of the most vital and progressive of our art museums, is co-author of *Indian Art of the United States*.

Handsomely printed in a large enough edition to insure continued availability, this book introduces in non-technical style the well developed and varied arts, which is to say the tangible expression of the cultures of each culturally distinct part of Polynesia, Micronesia, Melanesia, and Australia. It is a must for anyone interested in the so-called primitive arts (which are often highly sophisticated) from either the artist's or the anthropologist's point of view, or simply from that of anyone appreciative of the craftsmanship of his fellow men in other parts of the world. Artists who live or starve by the degree of interest accorded their work in, say, the United States may, while seeking inspiration from these carvings, masks, and richly or austere ornamented artifacts, reflect on the indispensability of the professional artist in many Pacific societies.

As we go to press, we have word from Dr. Walter Heil, Director of our neighbor institution, San Francisco's De Young Museum, that Professor Wingert has lately been in the Pacific Islands gathering material for a great exhibition here, early in 1953, of Arts of the South Seas. May the book enjoy a goodly sale at the De Young's counter! D.G.K.

Passage to windward

CAPE HORN TO THE PACIFIC: The Rise and Decline of an Ocean Highway. By Raymond A. Rydell. University of California Press, Berkeley and Los Angeles. 1952. ix + 213 pp., text map. \$4.00.

Suppose you had built a garage with a double swinging door and with its back to an unceasing, powerful west wind. The very first day, your wife drove in too fast and knocked down the back wall, making it a veritable wind tunnel, open at both ends, the doors swinging wide. You cannot close them against the wind, and you can barely drive through in low gear on good days; on bad days your car is blown right back into the driveway.

Such is Drake Passage. As you face west — to windward — the left-hand door is the Palmer Peninsula, thrusting north from Antarctica and bending sharply eastward. The

right-hand door is Tierra del Fuego, swinging sharply eastward from the south-pointing tip of South America, with its hinge at the Strait of Magellan. Its inside doorknob is Horn Island. The southern extremity of this very small island bears a big and terrible name in world history — Cape Horn.

Cape Horn to the Pacific is a taut and tangy history of one of the greatest challenges men ever faced in their conquest of the globe. Sailing west for the Indies, they found their way blocked by two continents, maddeningly joined by an isthmus. On a September afternoon in 1513, "Balboa first looked upon the South Sea. From that day until another, seven years later, when Magellan burst into the Pacific via his strait, an American water passage to the Orient was the most sought-after prize in the western world." But it was another hundred years before men first sailed "around the Horn."

In telling how men used and were abused by this prize during the 400 years from Magellan to the Panama Canal, Raymond A. Rydell, who is associate professor of history at Los Angeles State College, relates a large portion of Pacific history, and gives the answers to many intriguing questions. Who first sailed around the Horn, and what was it named for? How did the old China trade lead to American interest in the Antarctic? What Civil War naval action took place in the Pacific Ocean? Why were the clippers designed, what famous American scientist wrote a book that made possible their amazing record passages, and why did the clipper ship era end in just four years?

Here is the story of the great days of American whalers; of California trade before the Gold Rush; of missionaries to the South Seas; of the U. S. Navy's vital role in the Pacific a hundred years before Pearl Harbor. In these salty pages are Sir Francis Drake, Captain Cook, David Porter and the *Essex*, Melville, and Dana. There are lively passages from logbooks and the accounts of explorers and discoverers. For the serious student, researcher, librarian, or bibliophile, the last quarter of this valuable work consists of copious notes to all the nine chapters, an exhaustive bibliography, and complete index. Professor Rydell has made a thorough-going and scholarly contribution, but has most wisely kept his documentation from slowing up a highly readable, exciting, and witty book. D.G.K.

EDITOR'S END PAPERS

Florida's conquest of De Soto

THE FLORIDA OF THE INCA: A history of the Adelantado, Hernando de Soto, Governor and Captain General of the kingdom of Florida, and of other heroic Spanish and Indian cavaliers, written by The Inca, Garcilaso de la Vega, an officer of His Majesty, and a native of the great city of Cuzco, capital of the realms and provinces of Peru. Translated and edited by John Grier Varner and Jeannette Johnson Varner. University of Texas Press, Austin. 1951. xlviii + 656 pp., decorative end-paper map and frontispiece portrait by Reese Brandt. \$7.50.

Among the books that pass in succession across a reviewer's desk, an occasional one will stand forth to win his utmost attention and respect. This uncommon book may give deep satisfaction, perhaps sheer delight, on several counts, start-

ing with the binding and format. Begun in haste, if time presses, its reading may become an experience to be savored leisurely and in full, to the last page, and drawn out in lingering retrospection. Such a book is *The Florida of the Inca*, distinguished first issue from the University of Texas Press.

This is a monolithic book. In the conception of the dedicated author, who saw it in print in 1605, nearly thirty years after it began to shape in his mind, and now in this first complete English rendition from the Inca's Spanish, *The Florida* is a foundation-stone of American history. It tells one story — De Soto's grandiose attempt to conquer with 900 men and 300 horses the southeastern corner of North America, 1539-1543 — together with the historical context of events leading to the venture and consequent upon it. The narrative is compiled chiefly of the recollections of surviving veterans of De Soto's army, although the translators admonish us in their Introduction that, "in searching for the truth of history in *The Florida*, we should be mindful of the character of all sources, and we especially should not lose sight of certain obvious facts concerning the man who gave this story its final form." For this Peruvian son of an Inca princess and a Spanish conquistador, "Garcilaso, in spite of his insistence that his role was no more than that of an amanuensis, was tinting the picture with his personality, his erudition, and a well-defined literary style." Nevertheless, "in *The Florida*, which represents the most lengthy of the early accounts of De Soto's expedition, we find not only innumerable trustworthy details of a vast area of what is now the United States, but in addition a most accurate picture of the spirit and temper of the age which witnessed the discovery of these lands. Moreover, laying aside its value as a chronicle, we still may see in its pages a splendid specimen of sixteenth-century literary art. And so it is that this truly American work, along with the well-known *Comentarios Reales*, has won for Garcilaso the distinction of being the first American to attain pre-eminence in literature" although the Inca lived most of his life, and wrote both *The Florida* and his famous history of the Inca empire and its conquest, in relative seclusion in Spain. He died in Cordova in 1616.

It is these "innumerable details" of our own country and its former Indian inhabitants, and "the spirit and temper of the age" of discovery which will, apart from the book's sheer magnificence as an adventure story, interest present readers most if they share this reviewer's leanings. Here we go again, trying to hook things up. Going back to Frank C. Hibben's *Treasure in the Dust* (reviewed in the May-June issue), we find ourselves on the fascinating borderline between archeological discovery and contemporaneous accounts. In his chapter on the Moundbuilders of the Mississippi Valley and contiguous regions. Dr. Hibben says of what has been called the "Death Cult": "Its beginnings are mysterious but they may be as late as the first Spanish explorations into the southern Mississippi. Such leaders as Hernando de Soto may have given the terrified Indians a premonition of death with their guns, crossbows, horses, and Spanish cruelty. . . . The Death Cult was flourishing during those years when the Spanish expeditions traced their difficult paths through the southern canebrakes" (p. 251ff.). Now turning to *The Inca's Book Three*, chapters XIV-XVII, we find De Soto and his entourage visiting two mortuary temples in a rich and populous area

near where Augusta, Georgia, now stands, which were also in effect treasure-houses and arsenals. "Having seen and made note of the splendors, sumptuousness and wealth" of the second temple, "and of the great quantity of arms and ornaments and the order in which each thing had been placed and arranged, the General and his captains asked the Indians what such magnificent equipment signified. The latter answered that the lords of that kingdom . . . looked upon the ornamentation and luxury of their burial places as their chief greatness . . ." (p. 324). It appears that these Indians were already thoroughly preoccupied with fetishes of death, but in any event their highly evolved culture did not long survive the several Spanish entradas, which sent thousands of them — and several hundred Europeans — to the Happy Hunting Grounds.

A search for more light on the Spanish spirit and temper — product of economic and social instability plus religious fervor in a homeland not long freed from the Moors — which set the course of eastern Pacific and Caribbean history from the Conquest to the revolutions, led us to Bernard Moses (*Spain Overseas*, Hispanic Society of America, New York, 1929). And for another example of the effects of the sixteenth century Spaniard's passion for gold and souls we need go no further than our present *PD* issue and André Gschäedler's straightforward account of Mendaña's voyage from Peru to the Solomons. Spanish civilizing zeal also blessed the far western Pacific, where its main impact was felt in the Philippines. From Hispaniola and Florida to Guadalcanal (briefly touched) and Luzon, there is a pattern, interrupted in space but not in design.

Speaking of design, those responsible for the makeup of this modern edition of *The Florida* have been most happily successful in giving it the spirit and flavor of those other times. The volume's division into six "Books" gave them the chance to use type ornaments, tail-pieces, and other decorative devices from the 1723 Madrid edition of *La Florida*, and some English initials from a 1598 Hakluyt which blend well with the Iberian style. We might captiously remark that perhaps they succeeded beyond their intentions, thanks to the University of Texas Printing Division — uneven, often too heavy, inking is characteristic of the printer's art of those centuries, and Spanish types had a blackish look. Overlooking this one fault of execution, the book is nobly conceived — the unity of design from binding to type face contributing to the quality we called monolithic — and an unqualified credit to its editors and publishers.

A book like *The Florida* provides an excuse to answer some who rail against the university presses as "competitors" of private publishing houses but enjoying the benefits of state subsidy or some form of endowment. To keep it short, this editor will say only that his small working library contains a goodly proportion of indispensable titles that would never have seen print if publication depended upon their being a good business gamble — so does the library of every college professor or other scholar, and that of many a layman with serious and purposeful reading interests. The occasional university press book that enjoys a large and profitable popular sale merely helps carry many no less worthy that by their very nature cannot sell enough to pay for their printing. We hope *The Florida* is more than carrying its own weight and is but the first of a long list from the Texas Press!

D.G.K.

INFORMATION DESK



EARTHQUAKES are unpredictable, but after some recent events in southern California this department prepared at once for the earthquake questions sure to follow.

Are earthquakes more frequent and destructive now than in past historic times? H.H., Berkeley

Earthquakes are nothing new. They are mentioned frequently in the Bible, one of the early references being II Samuel 22:8. The famous Colossus of Rhodes, a bronze statue 105 feet high, was destroyed by an earthquake in 224 B.C.; the pieces lay around for several hundred years, and were finally taken away by a junk dealer on the backs of 900 camels. There are several earthquakes of record in which more than 100,000 people perished—in India in A.D. 893, and again in 1737, in Japan in 1703 and 1923, and in China in 1731 and 1920.

Is movement along an earthquake fault vertical or horizontal? L.P., Walnut Creek

It may be either, or both. In the San Francisco earthquake of 1906, the maximum horizontal shift was 21 feet. In the Napier, New Zealand, earthquake of 1931, a large area was elevated 12 to 16 feet; later there was some subsidence, but what was formerly a yacht harbor is now used as an airport. Following the Alaska earthquakes of 1899, dead barnacles on the rocks indicated that the seacoast at one point had been elevated around 47 feet. Facts regarding recent earthquakes in California may be found on pages 28-29 of this issue.



In his superb book *The Desert Year*, Joseph Wood Krutch wonders (on pages 145-6) why the bats emerge from Carlsbad Caverns in a counterclockwise spiral. Then he also says: "In our part of the world, the water that leaves our bathtubs in a miniature whirlpool also spirals counterclockwise because the direction of the earth's rotation tips the otherwise neutral balance in that direction. I have read that in the Southern Hemisphere the normal direction of a vortex is clockwise."

He wonders if the bats in the Southern Hemisphere come out clockwise, and what would happen if some of them were transported to the north.

Well, I'm not a bat, but I do take baths. Now I'm wondering whether Telegraph Hill is part of the Southern

Hemisphere, for I can't get the water to run down the drain except in a *clockwise* fashion. Please see if any of the Academy staff has an answer, or answers, to the questions propounded by Mr. Krutch. Otherwise I'll go batty from taking so many baths. James H. Barbour, San Francisco

Water in horizontal motion veers to the right (clockwise) in the Northern Hemisphere, and to the left in the Southern Hemisphere, as a result of the earth's rotation. This is obvious in the case of the major ocean currents.

The *vortex* formed by water running out of a funnel swirls in the *opposite* direction in each case, i.e., *counterclockwise* in the Northern Hemisphere. This sounds confusing, but should be clear from the diagram.



Each particle of water flowing toward the center veers to the right; the result is that the center swirls in the reverse direction. If you still don't get it, think of the vortex as if it were a little wheel with paddles on it.

Now as to your particular problem, the direction of the vortex formed when water runs out of a bathtub is determined by a number of factors, including the shape of the tub and its outlet, and motion imparted by the way the water runs in, or by your splashing, or by pulling the plug, or by chance currents of air. Note that you can yourself start the vortex in either direction—this is termed a "forced" vortex in contrast to a "free" vortex. A free vortex will conform to theory—but generally speaking, it exists only in theory!

Spiral movements of animals present another question. Let's leave that till next time. (Drawings by Frank Rinna)

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SEPT. 9— *Powerful Poisons*

A close look at many animals that are bearers of venoms and poisons. Dr. Bruce Halstead, The College of Medical Evangelists, Loma Linda, California, Guest Scientist.

SEPT. 16— *Shocks, Tremors, Faults*

The causes of earthquakes, how science locates their sources, and how intensities are measured. Charles Herrick and John Farr, University of California, Guest Scientists.

SEPT. 23— *Mosquito—Man's Enemy*

The life cycle of pests that can cause epidemics and the never ending battle of control. Theodore Aarons, Alameda County Mosquito Abatement District, entomologist, and Dr. Edward S. Ross, California Academy of Sciences, Guest Scientists.

SEPT. 30— *Psychological Warfare*

The how and why of propaganda — mass psychology technique. Dr. Douglas M. Kelley, psychiatrist and criminologist, University of California, Guest Scientist.

OCT. 7— *400 Degrees Below Zero*

Research into low temperatures and experiments with liquid air. Dr. Harvey E. White, University of California, Guest Scientist.

OCT. 14— *Monkeys, Chimps, and Gorillas*

The intelligence, habits, and training of man's close relatives—Old and New World monkeys. Dr. Joan Morton Kelly, San Diego Zoological Society, and Carey Baldwin, San Francisco Zoo, Guest Scientists.

OCT. 21— *The Air We Breathe*

How scientists study problems of air pollution and the problems of modern living in metropolitan areas. P. L. Magill, Stanford Research Institute, Guest Scientist.

OCT. 28— *This Plastic Age*

Laboratory demonstrations of the plastic revolution which has brought new products to use, clothes to wear, and other changes in our living.

NOV. 4— *Inter-tidal Animals*

Invertebrates from deep waters, tidepools, and the seashore—their place in the evolutionary scale. Dr. Rolf Bolin, Hopkins Marine Station, Stanford University, Guest Scientist.

NOV. 11— *Glittering Gems*

The steps by which a precious possession, the diamond, changes from its rough state to fiery brilliance. Martin L. Ehrmann, gem expert, Los Angeles, Guest Scientist.

NOV. 18— *Luther Burbank*

Fifty years of horticultural progress in gardening and agriculture. Ernest Rothert, Santa Rosa Junior College, Guest Scientist.

NOV. 25— *Exploring Space*

Regions beyond the earth's atmosphere and man's efforts to get there. Dr. R. G. Folsom, University of California, Guest Scientist.

DEC. 2— *How We Walk*

The ingenuity of a research team applied to a phenomenon that most of us take for granted. Dr. Verne T. Inman, University of California Medical School, Guest Scientist.

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You still buy gasoline at 1925 prices

If you were to take a sentimental journey back into the mid-twenties by thumbing through a stack of old magazines, you'd find the page below in the *Saturday Evening Post* issue of July 4, 1925. Remember the square-topped cars of those days . . . with their flat windshields, wide running boards, big wooden steering wheels and soft tops?



Remember the prices? Things were a lot cheaper than they are now when almost everything you buy is 'way up in price . . . except gasoline. ¶ Actually, gasoline costs almost exactly the same today—aside from taxes—as it did when the beauty above was an exciting new automobile. ¶ And it's far better gasoline, too. Two gallons today do the work that required three in 1925. ¶ Few industries can match

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